French President Valery Giscard d'Estaing (left) and West German Chancellor Helmut Schmidt (right) listen to Danish

Premier Anker Joergensen during opening ceremonies of the Copenhagen European Economic Community summitteence.

At Copenhagen Summit Talks

EEC Leaders Set Community Vote Date

COPENHAGEN, April 7-Eu-Parliament will be held in June of ain and other EEC countries. next year, British Foreign Secretary David Owen announced.

summit conference aimed at sta- world protectionism.

direct elections to the European cause of legislative delays in Brit-

The conference was the first of three gatherings in coming ment, accompanied by their for-The date - June 7 to 10 - was months to discuss economic probdecided as the leaders began a lems and the growing dangers of

moting greater economic growth. Bremen early in July shortly be-fore the world economic conferropean Economie Community have been held in May and June ence in Bonn which President leaders agreed today that the first of this year, were postpooed be-Carter will attend.

The heads of state and govern-

Decline of Dollar

eign ministers, were seeking solutions to problems posed by the vorld protectionism.

decline of the dollar, growing uomedical protectionism.

decline of the dollar, growing uoemployment in the Commoo

1st Major Duel in Southern Lebanon

Palestinians Said to Fire on UN Unit

tinians firing oo United Nations occupatioo." troops sparked an hour duel in acekeeping for and UN sources said.

They said that Palestinian artillery fired oo UN positions near the town of Kaukaba. The UN troops respooded with light and medium machine-gun fire, guer-rilla sources said. There were oo

reports of casualties. The UN force entered Lebanoo following the Israeli invasioo

two weeks ago. There was no immediate indication as to what had prompted the Palestinian fire. But diplomats in Beirut speculated that it may have come from radical Palestinian factions who believe that the UN force is not insuring Isra-

el's withdrawal. PLO Criticism

The Palestine Liberation Organizatioo said here, "We consider the Israeli announcement on withdrawal a trick and part of the U.S.-Israeli conspiracy in this country. We believe that Israel

speculated that this may have

Reporter Loses Suit In U.S. Wiretapping

WASHINGTON, April 7 (NYT)—A Federal District Court judge yesterday dismissed a civil suit that Hedrick Smith, Washingtoo hureau chief of The New York Times, had hrought against former President Richard Nixon and several former government officials.

Judge John Smith jr. said that they had had a "good-faith hasis" for a wiretap that was placed on Mr. Smith's home telephone in 1969. He added that it had been maintained within the Justice Department's guidelines for national security surveillances. Mr. Smith, who was diplomatic correspondent for The Times when the tap was placed, had asked the court to rule that the surveillance

BEIRUT, April 7 (UPI)-Pales- has no excuse for prolooging its fueled Palestinian resentment. The Palestinians argue that the Norwegian UN troops are sta- UN presence should be limited to southeastern Lebanoo today, the tioned in the Kaukaba area. Dip- Israeli outposts to prepare for economic meeting in Bonn]," he first major fighting involving the lomats ooted that there were oo Israel's withdrawal from Leba- said.

> The Norwegians established a new roadhlock and fortified a road ocar Kaukaba yesterday. A Norwegian soldier was slightly wounded in apparent mortar crossfire between the Palestinians and Israeli posicions further south.

The flare-up occurred as UN officials arrived in Beirut for talks on logistical and administrative details of the UN presence.

The UN officers, under in-structions from Maj. Gen. Emmanuel Erskine, commander of the UN peace-keeping force, cootacted several persons in an effort to stop the south Lebanon clashes," UN sources said, They said that Gen. Erskine would proceed to the Kaukaba area to help restore peace.

Israel to Begin Withdrawal TEL AVIV, April 7 (AP)-Israel will begin a two-stage partial (Continued on Page 2, Col. 4)

1st Action by Interim Government

Rhodesia to Release Political Detainees

7 (UPI)—Several hundred black poliocal detainees, incarcerated without trial by Prime Minister lan Smith's former government. are to be released as part of Rhodesia's "internal" majority

rule agreement. The move — the first concrete step taken since the agreement was signed March 3 - was announced yesterday hy the executive council of the pre-majority rule interim government. The council is composed of Mr. Smith and three Rhodesia-based hlack leaders, one of whom, the Rev. Ndabaningi Sithole, was himself

a detainee in the 1960s. A statement said that 24 detainees already have heen released. Though inidally restricted in their movements, "all restrictions upon them will be withdrawn," it said. Orders authorizing the release of several hundred more detainees will be signed and processed next week, the statement said.

Confrontation Expected

The announcement preceded an expected confrontation of the interim government with Britain and the United States over the U.S.-British call for a new Rhodesia conference of all interested parties, including the militant ing figures that "the release of a released.

guerrilla-backed Patriotie Front. An U.S.-British diplomatie team was expected here soon -possibly tonight or tomorrow. John Graham, deputy under sec-retary at the British Foreign Office, and Stephen Low, the U.S. amhassador to Zambia, have been assigned to persuade the interim government to take part in the proposed conference later this month

The government has said that it will consider "constructive ideas" hut that the internal settlement cannot be renegotiated. It has said that Washington

and London, instead of pushing their own majority rule plan, should persuade the Patriotic Froot to join the internal agreement. But the Front calls the settlement a "sellout."

Conditions on Release

The announcement on the detainees said that "many of them are now prepared to support a cease-fire and work within the principles of the [internal] agree-ment," and that "release will be phased and will be subject to es-sential security safeguards." Those freed must promise not to take part in subversive activities,

The statement said without cit-

substantial number of detainees is envisaged. Authoritative reports have put the number of persons in detention at about 1,000. Josiah Chinamano, leader of the Patriotic Front-affiliated Afriean National Council-Zim-

babwe, said that, to his knowl-

edge, oo members of his party were among the 254 detainees recently freed. Meanwhile, James Chikerema. vice-president of one of the hlack organizations taking part in the internal settlement, said that members of Mr. Chinamano's

group recently tried to beat a sec-

tion leader of his own United Af-

rican National Council. And he warned: "The [black] government that will emerge after Dec. 31 [when a full power transfer is to take place] will not toler-ate that kind of fooling around. It will deal with them. Those will be African politics and African politics are tough."

Angry Reaction

SALISBURY, April 7 (AP)-Conservative white Rhodesians reacted angrily today to the announcement on the release of the political prisoners. And some blacks were asking why all political detainees are not to be

But first, the meeting dealt with purely Community matters - the that his administration "will con-

bly in France, to promote European unity; the fixing of a date next summer for the first communitywide elections and the issuing of a declaration on the democratic principles of the community.

summit meeting and we hope for positive results. Danish Foreign Minister Knud Andersen said.

"The situation in the world is that we have thorough negotia-security at oons at the summit and that we of Europe. lay the basis for further occouiations this summer [at the world

With 6 million unemployed throughout the Common Market and the situation getting worse, unemployment ranks high among the priorities as the Community leaders assembled in one of a regular series of thrice-yearly meet-

The leaders were scheduled to discuss a broad range of economie, monetary and international issues, including trade with Japan, relations with the developing countries, energy, the growing tendency towards protectionism and the means of stimulating ecooomic growth.

Market and the community's failure to achieve a respectable overall growth rate.

setting up of a foundation, proba-

This will be the best prepared

weapons of their own. tions in protest.

Mr. Carter's decision to defer

Mrs. Benigno Aquino, wife of the jailed opposition leader, votes in suburban Quezon City.

Test of Strength for Marcos Regime

Turnout Heavy in Philippines Elections

MANILA, April 7 (UPI)-Filiat between 80 to 90 per cent of where Mr. Marcos's wife, Imelda

pinos turned out in large numbers the 22 million registered voters. headed the administration ticket today to vote in the the country's Early this evening, the only magainst an opposition slate led by first martial-law national elec-

Political interest was centered

polls, killing four and wounding virtually uncontested for govern-

Police officials described the

(Continued on Page 2, Col. 2)

Reserves Option

Carter Puts Off Neutron, Awaits Soviet 'Restrain'

By Fred Farris

WASHINGTON, April 7 (IHT)—President Carter an-nounced today that he will defer production of neutron weapons and await signs of Soviet "restraint" in their construction and deployment of nuclear and conventional arms and forces.

Mr. Carter, in a statement announcing his long-awaited decision, said that "the ultimate decisioo" on whether to produce such enhanced radiation, weapons "will be made later" and "will be influenced" by Soviet "restraint in its conventional and nuclear arms programs and force deployments affecting the security of the United States and Western

Europe. The President said that he had ordered the Defense Department to proceed with the modernization of nuclear warheads for the Lance missile and 8-inch artillery but was "leaving open the option of installing the enhanced radia-

tioo elements. **NATO** Consulted

Mr. Carter said that the United States was consulting its NATO partners on his decision to put off. but not cancel - production of the ocutron weapons, adding tinue to discuss with them appropriate arms cootrol measures to be pursued with the Soviet

Mr. Carter said that the United States "will cootinue to move ahead with our allies to modernize and strengthen our military capabilities, both conventional and ouclear." He added: "We are determined to do whatever is so serious that it is imperative occessary to assure our collective -security and the forward defense"

> By inviting Soviet "restraint" in its military build-up, Mr. Carter clearly signaled Moscow that he was waiting for action that would make it unnecessary to order ocutroo warheads into production.

No Soviet Production

Previous public statements calling on the Russians to offer an inducement to halt U.S. ocutron production were answered only with announcements that they would oot build ocutroo

The Soviet Union had vigorously denounced the anticipated U.S. production of such weapons and had organized demonstra-

heads has therefore become a "hargaining chip" in U.S. negotiadons with the Russians on stra-

tegie arms limitation. Neutron weapons kill primarily hy radiation and generate less blast and heat than current nuclear weapons. They would, in the opinion of NATO strategists, be most effective against a massed

tank attack that Soviet or War-

Speaking from the deck of a Navy ship in the Pacific off Vla-

the production of neutron war- saw pact forces might launch against Western Europe. But opponents of the system

argue that its reduced blast and devastation effects would make it more tempting for commanders to use, thereby lowering the

"threshold" of ouclear war. The now-deferred neutron artillery shells were designed to re-place aging 8-inch and 155-mm. shells that have been deployed in

modernization program that Mr. Carter ordered would produce shells for either a neutron or a traditional nuclear version of the weapon, sources said.

Because of the complexities of such weapons, it would be a year or more from the start of such a program before a decisioo would

(Continued on Page 2, Col. 5)

U.S. Delaying SALT Brezhnev:

MOSCOW, April 7 (UPI)—Soviet President Leonid Brezhnev today accused the United States treaty, Mr. Brezhnev delivered of using the ocutron bomh as a hargaining chip in the Strategic Arms Limitation Talks and said that President Carter was stalling on a oew arms agreement for "political reasons."

divostok, where he and former sides are capable of finding a so-

President Ford agreed in 1974 to lution to what would seem to be oegotiate 2 new strategic arms the most complex problems and the documents that are being one of his sharpest criticisms over prepared now are largely agreed upon and thrashed out. If the fithe failure of the two superpowers to reach a oew SALT nal conclusion of this work is, nevertheless, being delayed, this "Almost three and a half years

have passed since that time and

the agreement has not yet been

signed," Mr. Brezhnev said: "The

is evidently for political reasons." The text of Mr. Brezhnev's speech was issued only hours after news of Mr. Carter's decision (Continued on Page 2, Col. 5)



William Whitelaw, who aunounced Conservatives' plan for limiting immigration into Britain.

In Conservative Party Proposals

Tough U.K. Race Curbs Urged

LONDON, April 7 (Reuters)-Britain's opposition Conservative party today announced tough proposals for curbing colored immigration.

Deputy Party Leader William Whitelaw outlined plans for an overall quota limiting immigration and a ban on immigration by

of dependents in the Indian subcontinent who wish to join heads

of households here, tougher restrictions on their entry and fewer work permits for foreigners. Race has become a hot political issue in Britain and the proposals

are likely to provoke protests and political clashes.

The Labor government yester-day said it would make no radical changes in immigration regula-tions. The parties rival policies face a crucial test in an April 20 by-election in the inner London

hlack population. Harsher Than Expected

area of Brixton, which has a large

The Conservative proposals, which contain eight policy changes, are harsher than expect-

Mr. Whitelaw told a Conserva tive conference in Leicester that they would be implemented by his party if it wins the next general election, which must take place within 18 months, and is widely

expected to be held this fall. The heated political argument about race started when Conservative leader Margaret Thatcher said that many Britons feared they might be swamped by the

colored population.
Yesterday Home Secretary
Merlyn Rees denied that this could happen and said that colored immigration last year was 28,000—a drop of 25 per cent

from 1976.
Britain's colored community numbers 1.9 million, about 3.5 per cent of the population, and is mainly composed of Indians, Pakistanis, Asians from east Africa, blacks from the Caribbean, and their descendants.

Called Gross Affront

The Conservative proposals were immediately attacked by im-migrant leaders. One of them said Zamboanga Dei Sur province, nigno Aquino Jr.

500 miles south of Manila, where suspected Moslem rebels aminthe Manila region, where oppohushed a B.F. Goodrich Co. truck sition forces mustered their carrying company workers to the strength, leaving the other areas

they were a gross affront to the Indian people.

Jagmohan Joshi, national secretary of the Indian Workers Asso-ciation, said: "They are devised to cause psychological disturbances, emotional upsets and the permanent division of families."

Kanti Nagdi, secretary general of the Confederation of Indian

husbands and fiances of Com-monwealth women.

Organizations U.K., said that the proposed register of dependents would mean immigrants registering themselves.
It is like requiring one racial

group to carry identity cards. The Indian community will be very, very angry over this package," he

Portugal Says Food Rationing Possible in '79

LISBON, April 7 (AP)-Portugal will be forced to ration food next year if it does not start to produce more. Trade Minister Basilio Horta warned today.

Announcing big increases in the prices of subsidized food items, Mr. Horta said that the government could not go on paying for imports at the present rate. "Supplies will run out next year if we do not become more productive," he said.

Prices of a "shopping basket" of essential items were raised be-

tween 10 and 3g per cent from last year, the minister said. He said that the package would be expanded to include chicken, eggs and other items produced locally.

But imported meat, especially beef, no longer will be subsidized, he said. The public would be en-

couraged to eat pork, which was in surplus last year.
The price increases follow rises of up to 50 per cent in transport. gas and electricity charges. Tax revenue is to be increased by about a third in a drive to halt the slide in the country's ailing econo-

Metalworkers End West German Strike

STUTTGART, April 7 (AP)— Striking metalworkers in the state of Baden-Wuerttemherg approved a compromise contract settlement yesterday, ending their three-week strike, a union spokesman said.

A spokesman for the union said that about 93,000 workers had voted in favor of the contract, which includes a 5 per cent raise.

Officials estimated the turnout in the populous Manila region

tions, which have been seen as a

test of strength for the regime of

The voting was for 165 elective

seats in the loterim National

Assembly, considered as the fore-

runner of a regular parliament.

Results are expected tomorrow.

President Ferdinand Marcos

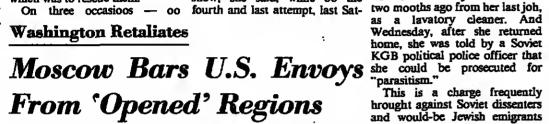
Muscovite to Try Again to Flee

MOSCOW. April 7 (AP)-A Russian woman seeking to rejoin her defector husband in Sweden declared today that she would keep striving to leave the Soviet Union despite the failure of an

airplane escape attempt. Describing the abortive scheme, Ludmila Agapova told Western correspondents that "only the groundless cruelty of the Soviet authorities forced us to

take this step."
Soviet officials had repeatedly denied appeals hy Mrs. Agapova, 39, to be reunited with her hus-band. Valentin, a Soviet merchant sailor who defected to Swe-

Mrs. Agapova told how she, her teeo-age daughter and elderly mother-in-law spent several cold. wet winter nights in an open shelter oear a lake about 25 kilometers from the Soviet-Finnish border while awaiting the plane which was to rescue them.



By Dan Fisher

MOSCOW, April 7-The Soviet Foreign Ministry is refusing nied by an explanation saying permission to U.S. diplomats who try to visit newly "opened" areas here, and Washington has begun to reciprocate by turning down Russians who wish to travel in the United States, it has been

Specific areas in the Soviet Uoioo were declared "opened" on Jan. 9 under what was billed as the first major liberalization of Soviet travel rules in more than 10 years. But the travel war cootinues and shows no signs of let-

The Soviet refusals seem directed specifically at U.S. diplomats. A U.S. and a British diplomat were turned down when they filed to travel together to Magnitogorsk in Fehruary. But another British diplomat was told that he could go. And two British defense attaches are said to have visited a oewly opened city near Lenin-

French diplomats were permitted to travel to Magnitogorsk, U.S. and other Western journalists were allowed to visit a city from which a U.S. diplomat was a newly opened

Baltie states. But U.S. Embassy persoonel have so far been unable to visit any of the opened areas outside of the immediate Moscow vicinity, according to embassy sources..

The reasons behind the Soviet travel refusals are unclear. Officially, the Foreign Ministry usually cites "reasons of a temporary nature" in vetoing the travel plans. But it may be that the U.S. Embassy has been more aggressive than other Western embassies in testing the new travel ruies.

Seven trips involving 10 sup-posedly open cities have been rejected by Soviet authorities since warning their followers against the oew rules went into effect. casting their ballots for the oppo-Embassy travel rules require dip-sition. One oppositioo candidate lomats to travel io pairs, meaning said 12 of her supporters were arthat at least 14 Americans have rested and that one was shot by

been affected so far.
A similar number of Soviet diplomats in the United States

13 Companies **Tokyo Tremor**

TOKYO, April 7 (AP)-A medium-size earthquake shonk Tokyo and its neighboring regioos today. There were oo reports of casualties or major dam-

WHERE THE WORLD MEETS



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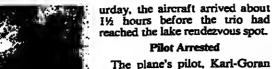
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The plane's pilot, Karl-Goran Wickenberg, and another Swede were arrested by Finnish police after they returned from the un-authorized flight into Soviet terri-

tory.
The airplane, a Piper Cuh, was to have touched down on the ice covering the lake, located oear the town of Priozersk, about 140 kilometers oorth of Leningrad.

But Mrs. Agapova said that even if the timing had been correct oo the final try, executing the escape probably would have been impossible hecause warmer weather had hy then melted the ice along the shore of the lake.

Uotil 1975, Mrs. Agapova worked as a mechanical engineer March 11, March 12 and March specializing in acoustical insula-tion for machinery. She was fired 19 — the escape plane failed to show, she said, while oo the fourth and last attempt, last Sat- two mooths ago from her last joh,

> This is a charge frequently hrought against Soviet dissenters and would-be Jewish emigrants after they have lost their jobs.

in the United States is accompa-Mrs. Agapova said that a key that it is in response to a specific case here. "We believe in reciprofactor in the decision to attemp the airborne escape was a Soviet official's remark during an intercity," an embassy source said.
The timing of the oew Soviet view in Sweden last summer that defectors such as her husband travel rules was believed tied to would oever see their wives and the opening of the final round of families again. the review conference oo European security in Belgrade. Freer

"After I learned of the interview, I realized that the only way to rejoin my lawful husband was to escape from the Soviet Union," she said.

Previously, Mrs. Agapova had tried sending appeals to the united nations, going oo hunger strikes and taking other steps all to oo avail,

She expressed the hope that Finnish authorities would not deal harshly with the Swedes arrested in connection with the

O Los Angeles Times **Turnout Reported Heavy**

In Philippines Election

(Continued From Page 1)

may also have been affected. Eve-

ry refusal of a Soviet travel ootice

movement of foreigners was one

of the provisions in the 1975 Hel-

sinki Pact, the application of

which was under review at Bel-

in the Soviet Union and the Unit-

ed States is a security precaution

that many U.S. diplomats believe

is outdated because both coun-

tries oow have oetworks of spy

The system of restricting travel

elections as generally peaceful sooo afterward was barred and a British and a U.S. correspondent traveling alone were allowed to law was imposed, when political district.

Two opposition poll watchers were reported arrested and their friends assaulted in the Pateros district. ties were usually neavy.

There were scattered complaiots, mostly in the Manila area, from both administratioo and oppositioo groups. The two camps accused each other of using "goons" to terrorize their fol-

Opposition leader accused the government of harassment and stuffing ballot boxes in the Philip-

pines' first election in five years. Mrs. Cory Aquino, wife of the imprisoced opposition leader, charged that a top coordinator of the People's Power coalition party was arrested in suhurban Makati by a police squad led by the

town's mayor. Mrs. Aquino accused police of

To Quit India

NEW DELHI, April 7 (AP)— Finance Minister H.M. Patel told Parliament today that 13 foreign companies so far have declined to reduce their share of ownership in local subsidiaries and have decided to leave India.

Mr. Patel said firms expressing their inability to comply with India's foreign exchange regula-tions act included IBM World Trade Corp., Coca Cola Export Corp., Eli Lilly and Co. and Con-solidated Pneumatie Tools, all U.S. firms; A. Johnson and Co., Baker Perkins and International Limited, and Columbia Grama-

phone Co.. of Britain, and Bunge and Co. Limited of Argentina. The nationality of the remaining five companies — Ingra, Keo-dall Farms Private Limited, Torrance and Sons Limited, Van Rees India, and Weddel Limited -was not listed.

the police last night, hut a police spokesman denied this.

Stuffed Early

The People's Power headquarters said that the coalition's poll watchers reported election workers stuffed ballot boxes even before the polls opened in many precinets throughout the city. Mr. Aquino, under military de-

tention since the proclamation of martial law in September, 1972, was sentenced to death last year for murder and subversion, but he was allowed to run while his case is under review.

The opposition called for a "noise barrage" among Manila residents last night to sound off their protest against the government and thousands responded hy marching through city streets, hanging on tin cans and drums and honking their car horns for

more than two hours. A ride through several parts of the inner city and the suburbs showed a widespread turnout for last nights demonstration.

There was no report of significant violence, and although a po-lice officer said that he had orders to arrest anybody joining the demonstration, it was unlikely that many were arrested because of the sheer numbers involved.

63 Prisoners To Leave Chile

SANTIAGO, April 7 (WP)-Sixty-three persons serving prison terms for politically-motivated offenses will begin leaving Chile for exile next week, the Justice Minis-try announced yesterday, the Los Angeles Times reported.

They will be the first beneficiaries under what amounts to a general amnesty for political of-fenders announced Wednesday by President Augusto Pinochet.

The total number of prisoners affected could eventually exceed 500, according to diplomats and Catholie Church officials.

tributing to European and world security through arms control and disarmament and through acts of mutual restraint as between NATO and the Warsaw pact.

NOT OUTTE RIGHT-This locomotive which appears to

be doing a balancing act near Bell Haven, N.Y., is a real show stopper — the whole show from Buffalo to Bingham-

ton. It got that way when the four freight cars it was pulling were derailed, wrenching it violently off the tracks.

Allies See Neutron Move

Forcing Soviet Restraint

NATO Assesses U.S. Decision

BRUSSELS, April 7 (UPI)— President Carter's decision to

defer prodoction of the ocutron

weapoo should convince the War-

saw pact to show restraint in its

Joseph Luns said today.

Ambassadors of the 15 NATO

nations were informed of Mr.

Carter's decision at a private

meeting. While expressing "un-derstaoding for the U.S. decision", the allies said that any

Mr. Luns said that the ambas-

sadors "reiterated their concern

about the increasing offensive ca-

pabilities of Soviet conventional

forces and with the cootinued expansion and improvement of of-

'Need to Modernize'

oeed to modernize NATO's mili-

tary capabilities, both conventi-

onal and nuclear. In this connec-

tion, the allies ooted that the

United States intended to proceed

with the modernization of the

Lance [missile] system and of the

8-inch gum, leaving open the in-stalling of enhanced-radiation

First Clash

In Lebanon

(Continued From Page 1)

withdrawal of its troops from

southern Lebanon on Tuesday,

affecting troops along the eastern half of the front, a UN spokes-

Plans for the the phased with-

drawal, which would be complet-

ed hy Friday, were presented to

the chief of UN operations in the

Middle East by Lt. Gen. Morde-chai Gur, Israeli's chief of staff,

during a meeting in Jerusalem

The first stage of the pullout

will affect an area east of Marjay-

oun, a Christian-held town three

miles north of the Israeli border,

the UN spokesman said. The Is-

raeli troops also will withdraw from the Khardali bridge over the Litani River, he added.

Begin Rejects Total Pullout

JERUSALEM, April 7 (UPI)—Prime Minister Mena-

ehem Begin said yesterday that

Israel will oot stand for total

withdrawal to the pre-1967 bor-

ders in a peace settlement.

9. Homesick.

(Another good reason to call home.)

An international call is the next best thing to being there.

"At the same time, the allies

[ocutron] elements.

man said.

yesterday.

"They therefore stressed the

fensive Soviet nuclear forces.

arms programs and force deploy-ments, NATO Secretary-General "The allies therefore expressed understanding for the U.S. decision to defer production of enhanced-radiatioo weapons. The allies agreed that further action

further action would depend on the restraint shown by the Soviet which affect NATO security.

"They agreed that the alliance will continue to consult on the subject and to discuss appropriate At the same time, they stressed the need to "modernize NATO's military capabilities, both cooven-tional and nuclear." Mr. Luns

Concini reservation. Still others felt that be might be trying to assess international opinion toward a Panamanian rejection of the reservation. Columnist Carl Rowan report-

ed in Washington Wednesday night that Panama had already told the United States that it could oot accept the DeConcini

yet made his intentions elear. underlined the importance of conate not to make any more significant changes in the treaties. Othrespooding to domestic oppo-

would be influenced by the degree to which the Soviet Unioo showed restraint in its arms programs and force deployments

arms control and disarmament measures to be pursued with the Soviet Union," he said.

reservation, but administration officials denied this yesterday. Administration officials said

Awaits Signs of Soviet 'Restraint'

By Robert G. Kaiser

(WP)-The government of Pana-

ond treaty now being debated.

ma disliked the disputed "De-

Concini reservation" to the first

duced by Sen. Dennis DeConcini,

The letter that Panama has cir-

culated at the United Nations and, reportedly, a second letter sent by Panamanian leader, Gen.

Omar Torrijos, to certain heads

of state — goes beyond mere dis-like and suggests that Panama may find the reservation unac-

ceptable. If that happens, the:

treaty could oot be properly rati-

fied, and the long effort to resolve:

the future of the canal by negotia-

U.S. Officials Worried

worried by this turn of events, of-

ficials said yesterday, but oot alarmed. Several official sources

said that Gen. Torrijos has oot

Some theorized that Gen. Tor-

rijos is trying to pressure the Sen-

ers suggested that he might be

cents who have attacked the De-

The Carter administratioo is

tions could reach an impasse.

hy the Senate.

the canal.

WASHINGTON, April 7

Carter Puts Off Production of Neutron

(Continued From Page 1) have to be made about the kind of shell it would be.

No Trade-off Proposal

No specific proposal oo arms trade-offs will be made to the Soviet Union, sources said, and no time limit was put oo the ocutron deferral.

But they said that a continued upgrading of Soviet or Warsaw Pact forces on the NATO froot or a refusal by the Russians to enter into any proposed negotiations could trigger the order to build ocutron shells.

"The option to go ahead is a real option," an administration official said.

The shape of Mr. Carter's decision seems to meet the demands of West German Chancellor Helmut Schmidt, who, beginning last

before publicly agreeing to de-ployment of ocutron shells or and not expected to be made warheads oo German soil. Problems in getting Mr.

Schmidt and his government to guarantee their support for production and deployment influenced Mr. Carter's reversal of his earlier plan to go ahead immediately with neutron productioo.

Unique Weapons

The oow-deferred ocutron shells and warheads would be, if built, the first tactical ouclear weapons designed to kill enemy troops primarily through radiation rather than by destroying their tanks and equipment.

Because they reduce blast and heat, proponents argue that they cause less collateral damage to towns and cities near the battle-

Production of the weapons was

December, sought an attempt at first approved by President Ford an arms trade-off with the Soviets in November, 1976 - a decision

Brezhnev Accuses U.S. Of Delaying SALT Talks

(Continued From Page 1)

to delay production of the neutron bomh was disclosed in Washington. Diplomats said that Mr. Brezhnev's remarks could oot have reflected the Carter decisioo within that time and was not seen

as a Soviet reply to it. Mr. Brezhnev said: "The matter is that the U.S. government shows indecision and inconsistency and looks hack at the circles which were against this agreement from the very beginning and which are doing everything they can to thwart it and free their hands for an uncontrolled

ouclear missile arms race." Mr. Brezhnev said that the United States and some of its NATO allies showed bad faith in considering the neutron bomh. "The United States and some

other NATO countries are trying to mislead the people," he said, "pretending that they are ready to hold talks with the Soviet Unioo on this question while they are in fact trying to make it the subject of bargaining and tying in this weapon with unrelated issues. Concealed behind all this is only one thing: A desire to move away from the clear-cut and coocrete Soviet proposal for mutual refusal to manufacture neutron weapoos. Such maneuvering does not testify to the seriousness of intentions to achieve disarmament oor does it facilitate advance toward this

'Must Meet Halfway'

"Outstanding questions [on a oew SALT agreement] cannot be solved without the United States making steps to meet us halfway. But, frankly speaking, we do oot see such steps of late. Ooe gets the impression that some people in the United States are out averse to interpreting our readiness to conclude an agreement as a chance to secure unilateral advantages for the United States.

"We do not demand that the agreement give us any advantages at the expense of the other side hut we expect the other side to take a similar approach. There can be oo other solution."

U.S. School Protest Ends

AMHERST, Mass., April 7 (UPI)—About 100 University of Massachusetts studeots who helped seize the chancellor's office in protest of campus dormitory conditions yesterday were granted immunity from prosecudoo and left the administration

that Panama has told them several times how much it dislikes the DeConcini reservation. Panama-nian and U.S. officials have discussed ways to "put a good face on it," an official said.

Raises Doubts on Key Amendment

Concern Expressed

ma has circulated a statement to members of the United Nacons raising the possibility that it will challenge or even reject a key amendment to the first Panama Yesterday, Panama's ambassa-dors to the United States, the Canal treaty approved last month United Nations and the Organi-The move raises oew uncertainzation of American States exty about the fate of the Panama pressed their concern about the Canal treaties as their supporters situation in Panama as a result of in the Senate have become inthe DeConcini reservation to creasingly confident of winning Sens. Alan Cranston, D-Calif., two-thirds approval for the secand Frank Church, D-Idaho, two key treaty supporters. It was already clear that Pana-Demonstrations were sched-

protest the reservation. treaty. That reservation, intro-U.S. Amabssador William Jorden io Panama informed Wash-D-Ariz. spells out a U.S. right to ington that the situation there is intervene in Panama to keep the very bad, according to a source. canal operating at any time after the year 2000, when Panama Several Latin American governments are upset by the Dewould assume full control over

uled today in Panamam City to

Concini reservation. President Carlos Perez of Venezuela told President Carter in Caracas last

Panama May Challenge Treaty week that he hoped the President could do something to mitigate

the reservation's impact. Some Latin American diplomais have suggested that some governments may refuse to ratify the treaty on the canal's neutrali ty, which will be open to adherence by all states, as a form of protest against the reservation.

The DeConcini reservation was accepted by President Carter, during tense negotiations, to win the two-thirds approval of the first Panama treaty in the Senate. The first treaty concerns preservation of the canal's neutrality; the second, now under consideration, spells out conditions for U.S. transfer of the canal to Panama between now and 2000.

Several liberal Democratic senators who support the treaties argued strongly against the De-Concini reservation as unwarranted and provocative. Administration officials decided they had to accept it to win over Sen. De-Concini and-several other sena-

Vance Tells House Panel

U.S. Is Assured by Turks **Over Military Operations**

BY Oswald Johnston

WASHINGTON, April 7—The Carter administration has been assured that Turkey will allow the United States to resume military and intelligence operations from about a dozen major U.S. and NATO bases closed three years ago if Congress lifts the arms embargo against Turkey, Secretary of State Cyrus Vance said yester-

Opening an administration campaign to coovince Congress that the embargo has outlived its usefuloess, Mr. Vance, accompa-nied by Defense Secretary Harold Brown, also told a congressional committee that he expects a serious negotiating attempt to solve the impasse between the Greek and Turkish communities on Cyprus within the next two

The embargo was imposed in early 1975 to rebuke Turkey for using U.S. weapons when it invaded Cyprus in July and August,

public until the weapons were de-

ployed with NATO forces in

Last June the Washingtoo Post disclosed that production of

Mr. Carter, after first acknowl-

edging that he had known about

the weapons, gave his initial sup-

port to them by requesting con-

gressional approval of their pro-

duction. But he said at the time

that he would withhold final ap-

proval pending consultation with

Revelation of the proposed

weapons caused a political uproar in West Germany. Oppositioo

then grew in other West Europe-

an countries, fanned in part hy

Soviet attacks on the new weap-

Britain Lends Support

LONDON, April 7 (AP)— Britaio supports Mr. Carter's de-

cision to postpone production of

the neutron homh, Prime Minis-

ter Callaghan's office announced.

The statement added that the So-

viet Union "should oow respond

to President Carter's decision by

measures to moderate the threat

which we see from the scale of

their huild-up of both ouclear

and conventional armaments."

the weapons was to begin.

Europe.

NATO allies.

1974. Attempts by the Ford administration to lift the embargo failed, in part because of pressure from Greek-American voters and politicians.

More Receptive

Mr. Vance and Mr. Brown found the House International Relations Committee yesterday considerably more receptive to their arguments than they had expected, despite the presence of Rep. Benjamin Rosenthal, D-N.Y., an architect of the original emhargo, and Rep. Gus Yatron, D-Pa., a strong supporter of the embargo.

Mr. Vance stressed that easing the embargo would make a Cypriot settlement more likely because it would remove political pressure under which successive Turkish governments have refused to negotiate.

He said that the new government of Premier Bulent Ecevit appeared strong enough and stable enough to compromise on a Cypriot settlement. He also said that a detailed proposal for a constitutional and territorial compro-

mise is expected in about 10 days. Mr. Brown said that the closi of NATO bases and U.S. intelligence installations had seriously weakened the alliance and damaged the ability of the United States to monitor Soviet strategic

missile launch tests. Reopening Possible

Mr. Vance disclosed that the Turks have agreed to reopen the hases when the embargo is lifted. He also held out hope of the more important installations being activated immediately while a new agreement on their use is worked out.

The closed U.S. intelligence bases include Diyarbakir and Pirinclik, two radar installations in southeast Turkey, and Belbasi, a seismic detectioo base near Ankara that monitored underground nuclear explosions. Also considered critical are Karamursel, a ship-monitoring facility near the Turkish straits, and a similar installation at Sinop, oo the south coast of the Black Sea.

Mr. Vance noted that the Cyprus oegotiations, at a standstill for the last year, are due to be reopened later this mooth when the Turkish-Cypriot community presents its constitutional and territorial proposals to United Nations Secretary-General Kurt Waldheim. If Mr. Waldheim agrees, talks with the Greek-Cypriot community could be resumed.

Kremlin Sees Dangerous Trend In Popularity of 'Crucifix' Jewelry

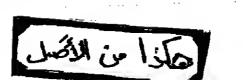
MOSCOW, April 7-"I have a cross," the middle-aged Moscow woman whispered, pulling a hillfold out of her purse.
"Here, I'll show it to you." She glanced around to make sure that oo one else could see, then extracted a tiny blue-and-silver

"I don't wear it so I doo't give people something to gossip about," she said.

Crosses and crucifixes are officially taboo here, where the Russian Orthodox Church once reigned along with the czars, and the cross stood next to the two-headed eagle as a symbol of Russia. But crosses are not even sold in the jewelry stores today. although the few functioning ehurches still sell them.

Now young people have taken to wearing crosses as jewelry in what the government considers to be a dangerous fad.
Science and Religion, a state magazine, said recently, "A responsible Soviet citizen would never wear the cross as a piece of

The Moscow woman is typical of what the state apparently coosiders a dangerous, borderline case. She describes herself as an atheist. Why does she carry the tiny cross then? "It's a tradition," she said. "I'm oot a believer, but I am a real Russian. I like to go into a church now and then, too. Many people who are oot believers do. They go sometimes when things aren't going well, or when their parents are sick."



Two Receivers Malfunction

U.S. Scientists Perplexed By Voyager 2's Problems

By George Alexander

PASADENA, Calif., April 7-Just as they were beginning to overcome the problems that had cropped up on Voyager 1, scientists at the Jet Propulsion Laboratory bere yesterday were confronted with serious problems on the Voyager 2 spacecraft.

House Supports Repoliticizing of U.S. Post Office

WASHINGTON, April 7 (WP)-The House passed legislation yesterday that would return to the President and Congress some of the power over the U.S. Postal Service they relinquisbed seven years ago.

The bill, passed 384 to 11, would turn the postmaster general back into a presidential appointee, give Congress a veto appointee, give Congress a veto over policy changes such as the proposed cancellation of Saturday deliveries and remove the current ceiling of \$980 million a year on the postal subsidy. It would require the Postal Service to explain in detail to Congress such as in detail to Congress each year how it plans to spend its money.

Rejected by a 218-to-180 vote was a proposal to allow Congress to veto rate changes, which would have forced members to face up

to politically unpopular increases. The Postal Service was set up seven years ago as a semi-inde-pendeut agency on the theory that it would be more efficient if run first receiver aboard Voyager 2 is like a private company under its own board of governors separate from partisan politics. The House you any trouble," said the laborabill would abolish that independ-

Bowling Balls Burned

OLATHE, Kan., April 7 (UPI)—The fire department bere discovered two burning bowling balls behind a residential garage. Officials theorized that a disgrun-tled bowler, who had sworn off the sport, had elected to burn the

By George Lardner Jr.

WASHINGTON, April 7

sulted in the release of U.S. funds

for Philadelphia's Hahnemann

According to a government study of the \$14.5 million grant,

the administration at first decid-

ed to hold up the money under

the Impoundment Control Act of

1974, but then hurriedly reversed

itself under pressure from Rep. Daniel Flood, D-Pa. The flip-flop

came on the day before President

Ford's deferral announcement

Mr. Flood, who pushed the

Hahnemann appropriation

through Congress, and Rep. Josbua Eilberg, D-Pa., whose law firm was hired at about the same

time to secure additional financ-

ing, have come under investiga-

tion in connection with allega-

tions that they might bave profit-

ed from the bospital's \$63.5

Irregularities Found

Mr. Flood's and Mr. Eilberg's ac-

counts in the House were recently

subpocaned by a U.S. grand jury

A separate inquiry into the cir-

cumstances of the funding was

conducted in February by the

Community Service Administra-

in Philadelphia.

All bank records pertaining to

million construction program.

was to be sent to Capitol Hill.

Hospital.

Both Voyagers are bound for the planets Jupiter and Saturn and are due to arrive at Jupiter sometime next year.

The problems with Voyager 2 are in the probe's radio receivers. Flight controllers here noticed that one of two identical receivers aboard Voyager 2 was acting up.

They radioed a command to the unmanned probe, about 280 million miles from earth, to switch over to the second receiver. It did so and everything went smoothly for about 14 minutes.

Erratic Action

But then the second receiver began performing erratically, and controllers commanded the probe's communications system to switch back to the first receiver. "It went out on us almost immediately after the switch-over. an official said.

Because the probe is tuned to the first receiver, there is no way that controllers bere can signal the dead unit to instruct it to switch again to the second receiv-

However, the Voyager's onboard computer will switch automatically from one receiver to the other if it does not log any instructions from the controllers for seven days. This automatic switch was built into the Voyager's computer in case of problems with the probe's communications sys-

permanently off the air. Receivers usually don't cause the least troublesome equipment on any spacecraft today. But here we've got problems with two."

The fact that the second receiver also has been acting erratically has given an urgency to the problem. "Everybody has been pulled off [Voyager] number one," he added, "and put to work on number two.

FBI Questions Interest of Congressman

Ford Action on Hospital Funds Probed



THAT'S THE GOOD NEWS—A streetcar covered with flowers moves along Tokyo's last streetcar line to announce that the crews serving the trolleys will be cut by half—from two to one—as a step toward doing away with the entire decades-old system in the near future.

In Deaths of 3 Oklahoma Girls

Man Sought in U.S. Slayings Captured

Gene Leroy Hart

living with an old man who lived

in the house since November.

Wilkerson said.

Charges of barboring a fugitive

would be made against the owner

of the house, Sam Pigeon jr., Mr.

McALESTER, Okla., April 7 (AP)-Eight lawmen kicked down the door of a cabin in the scrubby hills of eastern Oklahoma yesterday and, after a brief scuffle, arrested Gene Leroy Hart, 34, the fugitive sought in the slayings of three Girl Scouts at a summer camp last year.

District Attorney Sid Wise said that Hart would be arraigned

today. He was taken to the state prison here last night.

He was captured by agents of the Oklahoma State Bureau of Investigation in the isolated cabin in the Cookson Hills, ending what was believed to be the largest manhunt in Oklahoma histo-

Dick Wilkerson, bureau deputy director, said that the agency had learned that there was "someone

sa, and Michelle Guse, 9, of Brosexually molested.

Hart bad been a fugitive since his September, 1973, escape from the Mayes County jail in Pryor, Okla., where he had been awaiting transfer to the state prison to begin serving a rape sentence.
Authorities linked him to the

slayings after finding two tattered photographs near the camp. Hart is believed to have printed the photos, taken at a 1968 wedding in southwestern Oklahoma, in a prison darkroom after serving as a photographer's assistant at the

by himself in a rural area and ture followed months of exhauswho cut wood and received some tive investigation: "You don't luck into anything in the Cook-The check was determined to be a Social Security check, and "You make your own luck by Mr. Wilkerson said it was believed that Hart had been living

ken Arrow, were found near their tent on June 13. Investigators said that two of the girls were apparently bludgeoned to death and the other strangled. All had been

ceremony. Law officials said that his cap-

Carter that the deployment of a Soviet bomber "has changed the character of the possible threat" Mr. Brown also urged the Presfrom the Soviet Union and that

also said that the Defense De-

Middle East, "at least through "While Arab inventories of military equipment are expected to remain considerably larger than those of Israel," Mr. Brown wrote. "The ratio is improving for the Israelis, and we would expect them to prevail in any war at least through 1983." The defense secretary's memorandum, to President Carter, civil defense program. For that

which was sent in the last two weeks, candidly discusses a wide modest efforts on our part could range of defense and international issues, including problems with the Atlantic alliance and growing have a high payoff." Soviet capabilities. The document, stamped secret, was obtained yesterday by The New York Times. Worty Expressed

In the document, Mr. Brown

expressed his worry about the new supersonie Soviet bomber. which has been code-named Backfire in the West, capable of reaching U.S. targets.

By Bernard Weinraub

capable of winning a war in the

Our policy in recent years has been not to invest beavily in continental air defense on grounds that it makes little sense in an era when we are defenseless against ICBMs and SLBMs," Mr. Brown said, referring to intercontinental ballistic missiles and submarinelaunched ballistic missiles.

"However, we have maintained modest force dedicated to air defense," Mr. Brown said. "That policy has been likened to a Coast Guard of the Air' - the intention being to prevent overflight provocations and free rides' without really aspiring to substantially reduce U.S. casualties in an all-out attack. "The advent of the Soviet

Backfire has changed the character of the possible threat," Mr. Brown added.

The defense secretary indicated

that as a first step in countering that threat, he was directing that 72 F-15 fighters from the Tactical Air Command "be made avail-WASHINGTON, April 7 72 F-15 fighters from the command of the comma

Stronger Air Defenses Urged

Brown Warns Carter on Russia

ident to support an increase in stronger air defenses are needed the nation's "small and static civin the United States.

Mr. Brown, in a 10-page secret annual increase of \$50 million a
memorandum to the President, year, at least until 1984, for the civil-defense budget, which now partment believed that Israel was runs at about \$100 million a year. "As you know," Mr. Brown

said, "the Soviets have shown great interest and considerable activity in this field [civil defense]. While I do not believe that the effort significantly enhances the prospects for Soviet society as a whole following any full-scale nuclear exchange, it has obviously had an effect on international perceptions, particularly in contrast to our small and static reason alone, I believe at least

Discussing the North Atlantic Treaty Organization, Mr. Brown told the President he was tentatively undertaking "an ambitious program" to store as much combat equipment and supplies as possible in Western Europe because Warsaw Pact forces could be mobilized so quickly that the United States would not have enough time to send adequate combat supplies.

This is a serious plan, and one of the key elements in improving our contribution to the alliance," Mr. Brown said. "Consequently, I bave diverted funds from the Navy and the Air Force to the Army to pay for this pre-position-

Budgetary Problems

Budgetary problems were discussed in some detail in the document, which is a summary of planning guidance given to the armed forces recently by the secretary and his staff.

Mr. Brown also indicated that he was perplexed by the Navy's problems and made it plain that it was probably up to the President to resolve some of them.

The basic problem, the defense secretary said, was that the cost of ships and planes for the Navy was rising faster than the defense budget and the Navy's share of it.

As an example, be said that three ships that were being considered for the 1980 fiscal year building program - a Trident submarine, a nuclear-powered cruiser and a medium-sized conventional carrier --- would alone cost almost \$4 billion, not much less than the en-

tire 1979 program. The situation faces us with something of a dilemma," he said. "On the one hand, we could decide to do the best we can at the current level of funding. The full effects would manifest themselves only a decade or more from now. On the other hand, we could fund the Navy at a higher level - perhaps \$3 billion today. If that were done within the current budget by transferring funds from the other services, I have no doubt it would jeopardize our efforts to improve our capability in the central front

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Navy Chief Attacks Carter Ship Curb

Fears Russians Will Overtake U.S. Fleet

By Norman Kempster

3d, the chief of naval operations,

The five-year shipbuilding pro-

gram President Carter sent to

Congress last month is not ade-

quate to maintain this country's

superior strength at sea unless the

program is increased substantial-

ly in future years, according to

Adm. Holloway, who retires in June, and Navy Secretary

Graham Claytor jr. avoided

outright opposition to the Presi-

dent by telling the House Armed

Services subcommittee on scapower that the Navy could live

with Mr. Carter's program for a

"The five-year plan that has

been presented to the Congress

will permit this country to main-

tain the current thin level of supe-

14 Ships a Year

Mr. Carter's program calls for

building an average of 14 ships a

year for the next five years. It

would provide for construction of

one diesel-powered aircraft car-rier in 1980 but no nuclear-

powered carrier during the five

Brown recommended the 14-ship-

a-year program after determining

that the Pentagon could do no

more within its \$126-billion

Mr. Claytor said that the Navy

could not transfer money from

other parts of its budget to ship-building. But be invited the

budget for fiscal 1979.

Defense. Secretary Harold

said today.

Adm. Holloway.

year or two.

Hart was charged with three WASHINGTON, April 7-The counts of first-degree murder on June 23, 1977, 10 days after coun-United States is in danger of losselors at Camp Scott near Locust Grove, Okla., found the bodies of ing its superiority over the Soviet Navy during the 1980s at the present pace of combat ship construction, Adm. James Holloway

the three girls.
Doris Denise Milner, 10, and Lori Lee Farmer, 8, both of Tul-

Carter Promises To Veto Costly Farmer Aid Bill

WASHINGTON: April 7 (WP)-President Carter yesterday told Congress that be would veto the multibillion-dollar emergency farm bill "should that legislation

reach my desk." In a letter to Sen. Edmund Muskie, D-Maine, chairman of the Senate Budget Committee and one of the leading opponents of the farm measure, the President characterized the legislation as being hastily drafted in an atmosphere of emotion and confu-

He said that measures to boost farm income that were proposed riority in maritime forces for last week by the White House about 10 years," Adm. Holloway would be sufficient to aid the ag-

ricultural community.
The House Budget Committee earlier refused to recommend an increase in next year's budget to cover the higher costs of the farm bill, which would raise support prices for the coming season in proportion to the amount of acreage taken out of production.

Monkey Beater Beaten

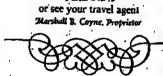
LONDON, April 7 (UPI)-A 200 keeper who was fired for allegedly attacking a monkey with a stick has been refused compensa-tion for what he charged was "unfair dismissal." An industrial tribunal did not believe that the keeper had struck the monkey in self-defense because it had taken "an aggressive stance."

lawmakers to raise the total Pen- Adm. Holloway said that such tagon budget and earmark the ad-

ditional funds for more ships. Adm. Holloway said that if the 14-ship-a-year construction rate was continued indefinitely, the Navy would have only about 420 ships by the end of this century because new construction would be well below the rate at which aging ships must be removed for 15 or 20 years at least." from service.

a fleet would be too small to maintain the Navy's worldwide role. He said that he would be reasonably "confident of success" with a fleet of at least 535 ships. A fleet of 585, he said, would give him "a substantial degree of confidence that we will stay ahead of the Russians in a maritime sense

O Los Angeles Times



tion, which Congress assigned to pay the Hahnemann money. A

Subcommittee approved a plan unlikely. yesterday to make possible the scheduled pullout of 6,000 U.S. troops from South Korea this

However, the plan sponsored by subcommittee Chairman Samuel Stratton, D-N.Y.. would require a "basic ground combat force" of U.S. troops to remain until a political settlement is and the other woul achieved between North and tion for 12 months.

Grounded Tanker Is Freed in U.S.

NEW ORLEANS, April (AP)—A U.S. tanker loaded with Alaskan crude oil has freed itself from a mud bank at the mouth of the Mississippi River and proceeded upriver.

A Coast Guard spokesman said that the 220-meter Mount Washington pumped its oil to the side which was afloat, lifting the other side from the mud. He added that there was no oil leak.

WASHINGTON, April 7 South Korea. Such a settlement is (WP)—A House Armed Services not in sight and is considered

drawal of troops over five years and the other would postpone ac-

House Unit Bids For Korea Plan

The Stratton plan, adopted 7 to l. against the dissenting vote of Rep. Ronald Dellums, D-Calif., represents a middle course between opposing views in Washington about the immediate future of President Carter's troopwithdrawal plan. One proposal would allow the gradual with-

PARIS-BRINDISI-PATRAS-ATHENS

Train and Ship Service

nine-page report compiled by stated that the CSA, as the CSA general counsel Frank Jones government's anti-poverty agensingled out a number of irregular- cy, had been reluctant at the out-(WP)—The FBI is investigating a ities in the course of the still un- set to spend the unsought approsudden turnabout by the Ford completed project, including the priation. As a consequence, the administration in 1975 that reoriginated and, with the help of \$472,400. Released under the Freedom of an official at the White House Information Act, the report also Office of Management and Budget, arranged a deferral of the money to take effect June 24. 1975. Congress Has Last Word



New General

Col. Margaret Brewer, 47, was nominated by President Carter for one-star brigadier rank. If approved by the Senate, the 26-year veteran would be the first woman general in the history of the U.S. Marines.

Another Smith

INDEPENDENCE, Mo., April 7 (AP)—Wallace Smith, great-grandson of the founder of the Church of Jesus Christ of Latter-Day Saints (Mormon), has assumed the presidency of the reorganized Church of Latter Day Saints, succeeding his 78-year-old

In taking the post, Mr. Smith became the sixth president of the church, which was established after the assassination of Joseph Smith jr. in 1839, nine years after

ized church has been a direct male descendant of Mr. Smith. Wallace Smith's father, W. Wallace Smith, was a son of Joseph Smith 3d. The elder Smith had been president of the reorganized church for 20 years, succeeding his brothers, Israel Smith and Frederick Smith.

To Lead Church

But under the Impoundment

Control Act, such intended defer-

rals must be communicated to

Congress, either chamber of

which can then overturn them

and direct that the money be

message stating that the money was being beld up to determine

what legal authority" CSA had

for hospital construction activity.

Citing an OMB official, the re-port then said: "Congressman Flood's office and Flood himself

brought pressure on the White

House "to reverse itself before

the message ever got to Capitol

President Ford had signed a

he founded the Mormon religion. Every president of the reorgan

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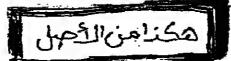
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Saturday-Sunday, April 8-9, 1978 **

Goading Israel

For 26 years Israel bas acquired arms under a formal agreement with the United States. On occasions too numerous to recite it has used those weapons outside as well as inside its own borders. Through three major wars and countless incidents, successive administrations have understood that the realities of Arab bostility justified the reading that, in using U.S. weapons in that way, Israel was acting in legitimate self-defense. Why, then, did Secretary of State Cyrus Vance feel bound to slap Israel bard on Wednesday by informing Congress that Israel "may" have violated the 1952 military-aid agreement in

its recent intervention in Lebanon? Mr. Vance offered no explanation. He merely made the charge and indicated Wasbington would not invoke the arms cutoff that a 1976 law requires if a "substantial violation" of a military-supply agreement is found. But that is unsatisfactory. What are the standards the State Department applies, in this case and in general? All arms recipients are entitled to know. Is it conceivable that "legitimate self-defense," the 1952 language, does not cover a country that has lost more than 1,000 lives to terrorists crossing from a neighboring state—Lebanon—that does not perform the elementary national

duty of policing its own territory? A country that, even as the rebuke arrives, is withdrawing its forces under the terms of a UN resolution drafted in the first instance by the United States? We don't understand.

We support the administration's strategy of seeking a Mideast peace agreement. But some of its tactics are insensitive. Right now, for instance, the administration should be concentrating on persuading Israel to rethink parts of its position in the negotiations with Egypt.

It can only weaken the U.S. case if, while presenting it, the United States acts in other ways to embarrass Israel and nourish its swollen suspicions that its security is of fading U.S. concern. It is one thing to criticize the Lebanese operation, as we have done, for its heavy civilian toll. It is another to smear Israel with a vague allegation that puts a cloud over access to the arms on which its security depends. As a good lawyer, Mr. Vance could have found a half-dozen other ways to handle the congressional inquiries on Israel's use of U.S. arms in Lebanon. Intead, a calculated decision seems to have been made to use the issue as a gratuitous political

THE WASHINGTON POST.

Succumbing in Nigeria

agreed to turn over power to an elected had not opened the door to the guerrillas sworn to destroy him. But there was, too, some recognition that the agreement between Mr. Smith and "internal" black nationalists reflected "some progress...a step in the right direction"-as, of course, it did.

In Lagos, bowever, Mr. Carter seems to have succumbed to Nigeria's uncomplicated fervor for a Popular Front guerrilla victory. The final communique omitted any mention of progress in Salisbury, although a multiracial interim government actually exists there. Rather, the communique (signed for Nigeria by its unelected military leader) pronounced the internal procedure "unacceptable, as it does not guarantee a genuine transfer of power to the majority"—as though the guerrillas, who have refused to settle for the share. of power they might expect to win in elections, will consummate "a genuine transfer of power to the majority" if they win by force

We understand that the administration and show South Africa that peaceable to Rhodesia, too. change works passably well. Those are wor-

Frankly, we liked the administration's thy purposes. But Mr. Carter's pursuit of Rhodesia-Zimbabwe policy better before the these purposes can be painful. Virtually all President dropped in on Nigeria. A month his rhetoric favors the external people. He ago, for instance, soon after Ian Smith holds Salisbury to lofty moral and political standards, while often appearing to wink at majority-rule government later this year, the the failings of the Popular Front. He refuses administration was still complaining that he to say the one thing that might most clear the air: that if the guerrillas reject a fair oportunity to come home while Salisbury moves to honest majority rule, the United States will go with Salisbury. His performance is all the more baffling when you consider that the internal settlement looks to be more democratic, moderate and multiracial than any gov-

ernment the guerrillas might construct.

Does the United States gain respect for itself and a bearing for its policies-among internal or external Rhodesians, in Nigeria or elsewhere in Africa-by conveying an impression that it will do practically anything to win liberationist credentials? We doubt it and we think the President doubts it too. fndeed, in Lagos he conspicuously did not do the easy, popular-in-Africa thing with respect to South Africa, choosing instead to affirm the United States' own, less militant policy. His hosts did not like it and said so. But on their part, they withheld any real support for the American effort to limit Soviet-Cuban intervention in Africa. Such candor-and conseeks to draw internal and external forces tinued discussion-is what good friends, estogether, the better to bring peace to Zim- pecially those trying to become better babwe, preempt Cuban-Soviet intervention friends, owe each other. ft should be applied

THE WASHINGTON POST.

Other U.S. Opinion

FBI and Terrorists

Most persons in the United States will praise, rather than criticize the decision of the FBI to give agents special training to deal with terrorist hijackings or kidnappings.

FBI Director William Webster disclosed the program in his first news conference. He said Europe's terrible experience-West Germany, the Netherlands and Italy in particular-convinced the agency it ought to be prepared for the possibility this kind of activity might spill over here.

European experts have been brought to the FBI training academy in Quantico, Va., to bolster the training program. The agency also is developing sophisticated "profiles" on potential terrorists and is working close with the Army's anti-terrorist program.

Now that Webster has reassured us, his public conversation on this subject should stop. Talking about the possibility of terrorism might be the cause of it. Some "crazy" somewhere might get it into his head to challenge the new program.

-From the Detroit News.

Problem of Bhutto

Pakistan's military junta headed by Gen. Zia may think it solved a primary problem the other day when a Pakistani court found former Prime Minister Zulfikar Ali Bbutto

guilty of conspiracy to murder and sentenced him to hang. The charismatic Bbutto, still the giant on the Pakistani political scene, has been a burden to Zia since the military overthrew Bhutto's elected government last year.

But Zia should think twice before the noose is slipped around Bhutto's neck. The former prime minister did not run a firstclass democracy. There is reason to believe that he rigged the nation's last election. And he may veey well be guilty of conspiring to kill a political opponent. However, there are three serious problems with Bhutto's trial, casting doubt on the legitimacy of the ver-

First, the prosecutor's case was presented in public, but Bhutto's defense was made behind closed doors. Thus only one side of the case has been heard openly. Second, Zia himself let it be known what be thought the verdict should be before the trial. Third, the chief judge made it clear that he had no love for Bhutto

Zia's government needs respectability, both at home and abroad. The general is not likely to achieve that, given the befouled atmosphere surrounding Bbutto's trial. Zia should seriously consider some form of

clemency. Otherwise many observers will wonder if he is indulging in officially sanctioned political murder—the very crine of which Bbutto supposedly is guilty.

-From the Milwaukee Journal.

International Opinion

France Should Negotiate

Europe is now in conflict with the tougher new U.S. policy on uranium supplies which is designed to prevent the spread of nuclear weapons to countries which do not possess them. To be more precise, France is in conflict: but a decision to negotiate with the United States is one for the [European Economic| Community in which France has a veto. The Americans...have given notice that is a treaty...

they want to renegotiate parts of the treaty with the Community under which they supply enriched uranium for European power stations. They want about 30 changes in all. but especially they want the power to forbid reprocessing of nuclear fuel originating in the United States and the transfer of fuel to third countries. France, which is expanding its own enrichment plant, insists that a treaty

-From the Guardian (London).

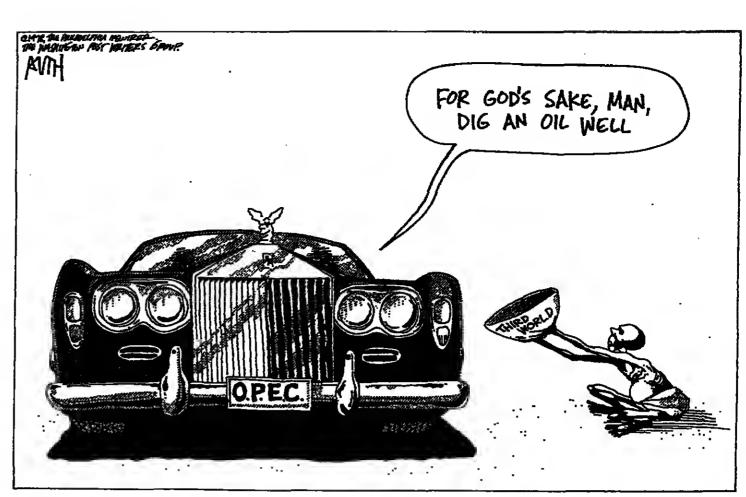
In the International Edition

Seventy-Five Years Ago April 8, 1903

PARIS-A glance at the Herald's front page this morning will satisfy the most rabid apparent of monarchical government that kings and emperors have an exceedingly hard-working time. The day of the "lazy king" is past. His Britannic Majesty, the Serhian king and the German Kaiser all had very busy days, whether it was regulating questions at home or abroad.

Fifty Years Ago April 8, 1928

NEW YORK-Predicting that "the world is on its way in fraternity and cannot miss its goal," Dr. S. Parkes Cadman, president of the Federal Council of Churches of Christ in America, in an address recently at the Bedford hranch of the YMCA. Brooklyn, spoke of an in his social relationships and reviewed the progress in recent years towards world hrotherhood.



Why Carter Hesitates on the Neutron Bomb

By James Reston

here recently for "hesitating" to order the production of neutron artillery weapons. Even some So it is possible for him to commembers of his own White House promise without banning the neustaff and Cabinet have wondered why he seems so troubled about

giving the order to go ahead.

Why shouldn't he be "troubled" and "hesitant" when be considers where this alarming competition will end? A halfstarved world is already spending over \$350 billion a year on weaponry, and if Jimmy Carter is committed to anything-politically and philosophically-it is to try to get this arms race by the

So after hearing all the arguments for and against these bandy little atomic weapons, be pauses, and temporizes, and thinks about compromising. And a good thing, too. If the Russians go ahead with every devilish new device their science and imagination can conceive—and they just about have—and we do the same to match them, and then they raise the ante to match us and so on, who will break the ring? And how will the nations ever progress toward a safer and more rational

Fuss

As I understand all the fuss over whether Carter decided against the neutron weapons and then pulled hack under pressure from his colleagues and allies, it is this philosophic question that has held him up. Besides, what's the rush? A

good argument can be made on military terms for producing neutron shells-they are tank-killers that would minimize and maybe even neutralize an attack hy the excessive Communist forces in Eastern Europe.

A counterargument can also be made, again on military terms, for not introducing them into the arsenal of the Western alliance on the ground that, if used against a Communist invasion, they might lead to an uncontrollable nuclear world war. But in political and philosophical terms, it is hard to argue with caution and delay.

The West Germans still have their doubts about the wisdom of deploying these weapons years from now on their soil. They want the Dutch and the Belgians to approve such deployment, though it is not clear that the neutron weapons now on the drawing boards could be used effecrively with a range of less than 10 miles except from West Germa-

Vance's Trip

Also, Secretary of Cyrus State Vance is going to Moscow at the end of this month to renew the delicate negotiations for a second Strategic Arms Limitation Treaty. So why decide the issue one way or another before be gets

Carter was not confronted by an either-or decision to produce or not produce these weapons. There are many different stagesin production of neutron weapnns, with or without their neutron

Protest on Israel

As one who grew up in an occu-

pied country, as one who has lived and worked, going nn four years in the Middle East, and as

an American, t protest the preoc-cupation of the world community

with the fate of the state of Israel.

For ton long, ton many real needs, real crises, real life-or-death situations have been slight-

ed and abandoned because of the

rael on our world's limited re-

WASHINGTON-President warheads. And many options on Carter bas been criticized bow and where and when they might be deployed after they were produced years from now. promise without banning the neutron weapons or rushing ahead with them. He could keep the neutron option open without rushing into it before Vance got to Moscow or the Allies had made up their minds.

For the hig question is not what is to be done about this particular weapon, hut what is to be done about the whole reckless and expensive process of the world arms race. And here Carter no doubt differs with some of his

Moral Issue

For him, the ever-expanding development of weapons is not only a military and political but a moral question. He is more willing than his colleagues in the Defense Department to take risks Soviets to do the same. In his view, as I understand it, he can the Russians insist on going ahead with all their own weapons, he can always, if reluctantly, go ahead with wbatever new weapons he chooses.

Also, there are some political maneuvers going on in all this. Carter has recently made a very tough speech about U.S.-Soviet relations. He made clear at Winston-Salem, N.C., last month that Moscow could have a second strategic arms treaty, but not if they continued to use their conventional weapons and their Cuban mercenaries to change the political map of Africa.

for peace, even if he has to hold ed to indicate that if there were a up the development of some new genuinc reduction of tensions, the apons in order to demonstrate question of producing U.S. neuhis good faith and encourage the tron weapons could be discussed. At the same time, he wanted the West Germans to know that the indicate his opposition to pro- neutron question was an Allied, ducing whatever new atomic and not solely a U.S. decision. If weapon comes along, and then, if West Germany wouldn't deploy it, there wasn't much point in Washington's producing it.

There is a great deal to be said about this neutron issue on all sides, but maybe it is not quite as urgent as it seems. There is a long lead-time in producing these weapons, and it will he longer still before they are put in place, if they ever are, Meanwhile. Carter has a lot to discuss with Soviet leader Brezhnev after the Vance mission to Moscow about the larger question of the arms

Having done so, he also want-

race and the political rivalries in the Middle East and Africa. And Berlinguer. this also looms in Carter's mind, larger than the present dispute over this one important weapon.

China Rights Issue: Hands Off

By Robert W. Barnett

practical duestion: Should we rights" of the Chinese people an obstacle to normalizing diplomatic relations between the United States and the People's Republic

We should want to seek better understanding of the moral content in bow and why Peking has sustained the legitimacy of its authority through means alien to sbapes China's assessment of the political experience of the Western world.

The psychic and philosophical premises upon which the Chinese system operates differ from those of other countries, whether or not year, the challenge to China's sur-Marxist, affluent or developing. But we should hesitate to condemn them as less moral merely because they are different from those of other societies. In fact, China could be giving clues to perception of moral necessities that we may be obliged to recognize if we begin to believe that we cannot assuage our economic and social dissatisfactions merely by perpetual opening up of new-resource frontiers, geographical and technological.

Chiang's Role

After World War II, Chiang Kai-shek was supported by friends at home and ahroad in an cffort to restore pride and effectiveness to a Chinese system crip-pled and demoralized by 150 years of humiliation and catastrophc. But the tragic fallacy in Chiang's leadership was that its legitimacy and moral sanction had stronger roots abroad than within his own Chinese environ-

The People's Republic of Chiла won its civil war because its authority was based upon strictly Chinese resources; its leaders

sources and on the resources of

the international agencies, re-sources that the world community

desperately needs. For peace, not

I protest our U.S. preoccupa-

tinn not to say nbsession, with the survival of our client-state,

Israel. I protest the apparent

domination of the U.S. govern-ment in this matter, by Israeli

pressure groups, just as I have

protested its domination by other pressure groups in the past. This

is anarchy. The U.S.-Israeli lobby

• I protest the willful abuse by

Letters

world's preoccupatinn with Israel. does a fine jnh, subverting, per-

I protest the demands made by Is- verting democracy.

WASHINGTON—The nation achieved total national self-relibeen a remarkable continuity of is putting before itself a lance through mobilization of the is putting before itself a ance through mobilization of the Chinese commitment to self-relimorai sur make Peking's record in handling committed to egalitarianism in what Americans call the "human the way it looked, it talks and behaves.

Visitors from many other parts of the developing world, awed by that achievement, can identify administrative mechanics, hut We should not. I go further, cannot imagine infusing their own people with the moral devotion upon which the Chinese system appears to be built. Harsb national necessity

"human rights." The first right is to survive. With China's population of 900 million to 950 million growing at a thundering rate of 15 million to 20 million year after vival has heen pervasive, sustained and profound.

China's responses, both voluntary and directed from Peking, reverse the stress in the freedonand-duty matrix upon which Western democratic traditions are built. But in Korea, Vietnam, Taiwan, Hong Kong, Japan and in China there seems to be utterly natural acceptance of the age-old Confucian tradition of subordinating individual liberty to collective obligation—for example, to the family. So here may be the clue to what—deep in the imagination of Chinese everywhere—is their moral equivalent to the individual human rights that Americans believe are sanctified by the Holy Bible, the Declaration of Independence, and the Bill of Rights in our Constitution.

From the days when China's leaders lived in Yenan caves to the establishment of national authority in Peking, through the Great Leap Forward, through the Cultural Revolution, through the arrest of the Gang of Four, and the re-emergence of the twice-humiliated first Deputy Primc Minister Teng Hsiao-ping, there has

Israel, of U.S.-gift war material, to destroy another country and to

kill and wound bundreds of inno-

cent man, women and children. Civilization means restraint. The

tsraelis, in Lebanon, have again put themselves with the barbari-

by Israelis of their own limited re-

sources of energy and technology, resources that have in the past

and that might have in the future,

been used for humanitarian pur-

poses in their own country, in the

JAMES SLAVIN.

Middle East and in Africa.

Dhahran, Saudi Arabia.

I protest the abuse and waste

rampant rivers, and what Norman Macrae, deputy editor of The Economist, calls China's present-day rural Keynesianism are expressions of that compul-Normal Ties Washington and Peking will

ance and egalitarianism

moral accommodation to the ne-

cessity ouf survival. China's

unshackling of its women, the

"barefoot doctor," the mass par-

ticipatory harnessing of China's

enter into normal diplomatic relations with each other because doing so serves the self-interest of both countries. Neither should entertain expectations that it can reform the other. We must respect China's right to be different, or, doing otherwise, expose ourselves to charges of self-righteousness, demagoguery, and possibly even of imperial intent.

China's now-emerging personalities, procedures and political vocabulary offer promise of greater readiness by China to deal more forthrightly with other countries around the world. With respect and curiosity, Washing-ton should hasten toward establishing normal diplomatic relations with Peking so as to ease exchanges of ideas, persons and goods from which the two countries can mutually benefit together and in their relations with other countries of the world com-

Robert W. Barnett, director of the Washington Center of the Asio Society, was Deputy Assistant Secretary of State for East Asian Affairs from 1963 through 1970. This was adapted by The New York Times from an article to appear in Worldview magazine.

New Style Communism

Still Exists By Joseph Kraft

DARIS—"Eurocommunism" was a word to conjure with when I visited Europe last year. Now, in the wake of the French elections, it is said to be a thing that never was.

In fact, Eurocommunism still exists. Only it has turned out to be far less than it was cracked up

At the root of all the confusion is an undounted change in the Communist parties of Italy, France. Spain and Portugal In-one way or another, they have all been brought up to date-reparkaged, as it were, for more pros-perous, less ideological consumer

societies.
Thus the Communist Party in all four countries regularly criticizes Moscow on certain humanrights issues. Even the French party, which is perhaps most in thrall to the Soviet Union attacked the recent Soviet decision to withdraw citizenship from the great cellist Mstislav Rostropo-vich.

The second undoubted change is willingness to work with middle-class parties. The Italian Communists have carried this trend furthest in the more terms. trend furthest in the move toward a "historic compromise" with the ruling Christian Democrats. But the parties in France, Spain and Portugal have also moved at times to work jointly with democratic

political groups,

A third change is a move toward a less dictatorial party structure. In France, cell meeting are supposedly open to the pub lic. In Spain, where the Commu-nists are competing with a dy-namic Socialist party, the party leader, Santiago Carrillo, is talking of genuine elections to party office. He at least implies jettisoning Lenin's insistence on control from the top, or "democratic centralism," much as Stalin has been cast aside as a guide on human rights.

A fourth change has been will-ingness to take into the party, in leadership posts, persons of nonproletarian origins. Many of the top figures in the Italian Communist party are aristocrats, among them Secretary General Enrico

These changes go beyond mere cosmetics. They have an inner dynamism, and they make an indent for further changes over time. They promote evolution.

But so far the West European Communist parties have not been transformed. For one thing, they still seek a monopoly of power.

Thus the Italian party would like to enter into coalition with the Christian Democrats by the route of "historic compromise. Berlinguer and his men are full confident they can outshine, and eventually crush, the old-fash-ioned and ailing Christian Demo-

In marked contrast, the French Communist party spoiled the chances of a leftist victory in the recent legislative elections by advertising their support for nationalization on a grand scale and hy their refusal to cooperate in de fense matters with the United States and other NATO countries. This sabotage was commit-ted because a leftist victory would have established the Socialists as the leading French party, thus compromising, perhaps fatally, the chances for an eventual Communist takeover.

Despite the show of openness, moreover, decisions are still taken in secret by the party bosses. It is now known that even at the height of their alliance, the French Communist leader, Georges Marchais, was denouncing the Socialist leader, Francois Mitterrand, at secret meetings of

the Politburo. Finally, the European Communist parties still work, and work hard, for the Soviet strategic interest. All of them oppose the major defense and international economic policies favored by Washington. All of them have backed Russia's allies in the Middle East and Africa-not to mention Cuha.

In sum, Eurocommunism is very much alive. But it is what it has always been: an updated version of communism pure and sim-ple. It may have a broader appeal in Western Europe, hut it remains a threat to the interests and values cherished by most Americans and most Europeans. So the right policy is to draw out for as long as possible the entry to power of any Communists in any West European country.

INTERNATIONAL

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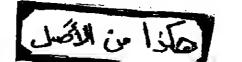
Puhhsher

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PACHYDERMIC PLAY—Soccer players at a safari lodge in Kenya get in a bit of practice with friendly clephants who let the players bounce ball off their heads for a few goals.

'Escapees' Stalking Animals in City

Roving Lions Are Not Pride of Nairobi

By John Damton NAIROBI, April 7 (NYT)-It

began late one night in December under a full mooo. Tony Church, owner of a safari company, was driving hack to his home, a 130-acre borse ranch

four miles from the Nairobi National Park. He was expecting trouble because there had heeo an attack the night before, so he bad already stabled 19 borses and lighted the burricane lamps outside. Only the old mare refused to go in hovering near the stable donr to be close to her weaned foal inside.

S. Africa Ends Terrorist Trial; 6 Are Convicted

PRETORIA, April 7 (AP)—One of South Africa's longest terrorism trials bas eoded with the acquittal of six blacks and the conviction of six others on charges of conspiring to overthrow the government.

The 12 were charged with be-longing to the banned African National Congress and plotting since 1962 against the government. They were also accused of receiving military training in Mozambique and the Soviet Union. sabotaging railroads and illegally possessing arms.

They were first detained 16 months ago and went on trial ear-ly last year. But the original judge died, and the trial had to he res-

tarted in January.
The judge said yesterday that the state bad proved beyond doubt the existence of a plot against the government. But he acquitted Paulina Tsiki, 21. Lele Jacob Motaung, 44, Simon Samuel Mohlanyaneneng, 23, Martin Ramokgadi, 67, and Jacob Gaonakala Seatholo, 47.

Rhodesia Says 28 Killed in Day's Clashes

SALISBURY, Rhodesia, April 7 (UPI)—Black oationalist guerrillas attacked a botel io southwestern Rhodesia in a flurry of incidents that claimed 28 lives in the last 24 hours, the military command said today.

The command said that insurgents last night attacked the Gwaii River Hotel, the bub of a farming community in southwestern Rhodesia.

The latest incidents were reported on the eve of the arrival of a British-U.S. team assigned to promote an internationally recog-

The team of John Graham, deputy uoder secretary of the British Foreign Office, and Stephen Low, U.S. amhassador to Zamhia, is scheduled to arrive to-

morrow night. The two envoys will try to convince the Rhodesian government to accept a British-U.S. call to stage a new Rhodesia conference, attended by all parties to the dis-pure, including the guerrilla-backed Patriotic Front.

Gutenberg Bible Nets \$2 Million

NEW YORK, April 7 (Reuters)—A Gutenberg Bible, one of the world's rarest books, fetched a record auction price of \$2 million here today. The two-volume Bible was

bought at Christies auction house by New York bookseller Martin Breslauer, who said he bought it

for an anonymous client.

Mr. Breslauer said: "I was determined to get it at almost any price." The previous record aucnon price for a printed book was short and sweet. "OK, they like short grass," he said. "People say we should be hurning and many the state of America," also sold at Chris-

"I got back at midnight," Mr. dooe that in the past. But what Church related. "I jumped into happens if we burn it and we my pickup to take a look around. doo't get more rain?" There was a full moon. Deadly quiet. Theo I saw them. It was an amazing sight. About 100 yards

making a kill." and she was already balf eaten. It make a kill, which is rare. was like a sceoe out of the game The Nairobi lions have more

A Pride on the Loose

the national park, a 44-square-strong, but they're really very mile preserve fenced in on three stupid." sides, whose main gate is only five miles from the city center. world where it is possible to go to The lions have been prowling the a drive-in movie on the edge of suburbs of Langata and of the game park and bear a re-Karen. The latter is named after sounding roar from the darkness Karen Blixen, the writer wbo in response to gunfire on the published soaring evocations of screen. Nowadays, however, few East Africa - marauding lions who live bere have seen a lion at included - under the name Isak close range, except perhaps from Dinesen.

were regarded as something of a compounds to guard against the der duress. lark. "Girls will be girls," said an lions of Langata. editorial in The Daily Nation in December, recalling that the pranks before, including a sit-in on the Membasa road.

The predators have been shot with darts, drugged and returned from a party." to the park but still continue to evade a high fence to hunt for food in the residential areas, and now the jesting has given way to alarm. Editorials are calling the situation a scandal.

None of the lions has attacked a human being. But they have helped themselves to six borses, a cow and a dog. They have unsettled a oumber of residents, who discover their German shepherds quivering to come indoors at night and wake up the oext morning to find claw marks on the stable doors and lion spoor across the driveway. Some are concerned about the long-term impli-cations of having wild animals at the doorstep, considering that Nairobi, with a population of 800,000, is growing so rapidly that it is encroaching upon Baroness Blixen's beloved acaciacovered hills and the beasts that inhabit them.

Cooservatiooists, ecologists and students of animal behavior agree that the lions, which are permanent residents of the park and number about 40, have been roaming because their primary sources of food, the zehra and the

wildebeest, are in short supply. Moving With the Rains

The berbivores migrate seasonally in and out of the park through the southern opening, moving across the adjoining Athi Kapiu Plains all the way to the Amboseli National Park and Tanzania. They leave the park during the rainy seasons, espe-cially the "long rains" from March to June, and return during the dry spells, when the park of-

fers the only drinking water. This year, explained Samuel Ngethe, the chief warden of the park, the rains have been so plen-tiful that the zehra and antelope have not been compelled to return. He conceded, too, that the park grass had grown so high that it was shunned by the grazing animals, which like their grass ing to draw them back. We have

preserve — these four magnifi- cootact with lionizing bumans cent creatures oo a kill and half a or at least with cars-than their dozeo byenas running around cackling, and you know how they fluff up their tails."

or at least with cars—than their cousins in other parts of Kenya. They also have a stronger lazy streak and prefer easy prey. "Our streak and prefer easy prey. "Our lions are not like the others," Mr. Ngethe explained. "They don't go Nairobi is in the midst of a lion for strong animals like bulfalo. scare. For three months a pride of They go for the hartebeest or the lions has been "escaping" from wildebeest. The wildebeest looks

a car, so it was little consolation Initially the forays by the when the minister of tourism and liooesses (females do the bunting) wildlife told them to fence their wildlife told them to fence their

"If we secure all our livestock," said Mr. Church, alluding to his Nairobi lions bad engaged in horse ranch, "these lions are going to get so damned bungry they'll feed on some drunken buman being staggering back

For years the Nairobi preserve from my froot door there were has been the biggest money-earnthese four magnificent lions, er in the national park system, av-They were obviously bell-bent on eraging 140,000 paying visitors annually. One reason is that it lies Mr. Church, who had lost two on the edge of the city; another is colts to the lions the night before, the high probability of spotting telephoned the veterinary at the lions. "Wapi simba" — "Where is park beadquarters. Then, rushing the lico?" - is a common back to the stable from his house, Kiswahili greeting between he noniced that the old mare was parked motorists on a busy Sungone. "She was lured into an day. Up to a dozeo vehicles are ambush," he said. "It bappened apt to cooverge on a drowsy lion, so fast. I went back to the lions waiting for it to rouse itself to

This may be the only city in the

Businessman Not Seriously Hurt

Red Brigades Claim Shooting in Genoa

ROME, April 7 (UPI)—The The Italian government and Red Brigades, who claim the abduction of former Premier Aldo secret talks are going oo with the Moro, today took responsibility kidnappers.
for the shooting of a Genoa husiMeanwhile for the shooting of a Genoa husi-nessman in the legs and right braced for trouble today after of-

Police said that two men shot Felice Schiavetu, president of the Genoa Industrialists Association, in an amhush oear his home, grabbed his attache case and fled. Doctors said that his injuries were oot serious.

telephooe caller told the oewspaper Corriere Mercantile soon afterwards. "We shot Schiavetti. A communique will follow."

damaged the cotrances of a police station, two Christian Democrat-ic party offices and the headquar-

the rightist Italian Social Movement magazine Candido, said that be received a call from an anooymous informer saying that the Red Brigades "have begun undercover negotiations with the government to barter the life

The caller is quoted as saying

ruling Christian Democrats.

presidential bopeful, bas beseeched his party to arrange a in captivity and presumably un

rector of the agency.

For a Sex-Change Operation

SAN DIEGO, April 7 (UPI)—Federal officials said the Medicare program will pay for a \$5,600 sex-change operation for a man who has dressed and lived as a woman for three years. The operation will be performed on Bobbie Lea Bennett, 31, who is confined to a wheel chair by a rare booe disease.

"From the information we have," be said, "it sounds as if Bobbie Lea Bennett would qualify for Medicare payment, and so the new policy amounts to a go-ahead for her surgery." Mr. Bennett, suffering from a disease that results in calcium-depleted bones, was married twice before be reached the age of 20. His first wife died in a car accident and his second marriage lasted only one day.
"By this time," he explained, "I knew I was really a woman."

After three years of hormonal treatment and psychotherapy
— which Medicare paid for — Mr. Bennett said he was told March 23 the program would oot pick up the tab for the opera-

tion. But that was reversed by Mr. Tierney.

Upon hearing the oews, Mr. Bennett said, "All I really want is to find Mr. Right, get married and be a housewife."

FRANCE-PARIS AMERICAN CATHEDRAL 8:38 and 11:38 a.m. day School 10:00 a.m. e. George-V. Paris-8 i::359-17:90 Metro:

AMERICAN CHURCH IN PARIS WORSHIP SERVICE 11 a.m.
A Protestant Church
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In Rome, a series of bombings station, two Christian Democratic party offices and the headquaters of a Roman Catholic organization. And a policeman's parked car was set on fire. There were no injuries.

There were no injuries.

Ransom Demand Reported

Meanwhile, a oeo-Fascist magazine said today that the terrorists are demanding \$1 hillion in ransom for Mr. Moro's release.

Giorgio Pisano, political editor

and liberty of Moro at a very high

The Red Brigades kidnapped Mr. Moro on March 16, gunning down his five bodyguards. In one communique they said that they had put Mr. Moro on "trial" to discover the wrongdoings of the

Mr. Moro's wife today wrote an open letter in a Milan newspaper, telling ber husband that his family is living the ordeal with him "minute by minute."

Premier Giulio Andreotti, at least publicly, has rejected any negotiations with the Red Brigades, who have indicated that they want all of their imprisoned comrades - about 160 persons released in exchange for Mr.

Mr. Moro, 61, president of the Christian Democratic party and a trade. But his letters were written

Top Aide Named by FBI

WASHINGTON, April 7 (UPI)-FBI Director William Webster yesterday announced the appointment of James Adams, 51, a career FBI man, as associate di-

Medicare to Pay \$5,600 Tab

Thomas Tierney, director of the U.S. Department of Heath, Education and Welfare's Medicare bureau said a new policy extends Medicare coverage to sexual change, as long as the surgical candidates "have at least one year's experience living as a member of the opposite sex.

CHURCH SERVICES

FRANCE-PARIS ST. GEORGE'S ANGLICAN CHURCH SUNDAYS: SUNG EUCHARIST 10:30 at 4 Rue de Lubeck, Para 16e [Metra: Ieno, Borssiere; bus: 63, 82]. Information about other services from the Chaptain, the Rev. J. Livingstone, 7 Rue Auguste-Vocquerie, 16e. 72022.51.

Mr. Moro's kidnappers.

More than 100 leftists were de-

tained two days ago but at least

ficials banned demonstrations 50 have since been released. The that were planned to protest the arrests of leftists in the hunt for paper L'Unita had said that the arrests were "indiscriminate" and other leftist oewspapers had la-

Obituaries

Nicolas Nabokov, 75, Composer

re oot serious.

"This is the Red Brigades," a Nicolas Nabokov, 75, a composer and writer who organized three of the largest and most influential international music festivals in foundations. the noo-Communist world in the 1950s and 1960s, died early yes-terday of a heart attack following

an operation.

As a composer, Mr. Nabokov bas been known chiefly bere over the last 13 years as composer of the score of "Don Quixote." a full-length ballet created by George Balanchine for the New York City Ballet in 1965.

He composed five ballets, the earliest of which was "Ode" for

Serge Diaghilev's Ballets Russes in 1928. "Union Pacific," which he himself called "the first truly American ballet," was done for Col. De Basil's Ballets Russes and was introduced in Philadelphia in 1934. The libretto for "Unioo Pacific" was by Archibald MacLeish.

Mr. Nabokov also composed that if \$1 billion is not paid at a operas to librettos by Stephen time and place to be given later. Spender and W. H. Auden, three then "the Red Brigades will pub- symphonies, some large concert lish everything they have got out works for voice and orchestra and

of Moro, who knows the whole concertos for piano and flute.

background of 30 years of government."

The Red Brigades kidnapped

Concertos for piano and flute.

Despite this output. Mr. Nabokov was much better known for his achievements from 1951 to 1963, when he was secretary-general of the now defunct Coogress for Cultural Freedom.

During this time be organized three spectacular festivals. The first, "Masterpieces of the 20th Century," was beld in Paris in 1952. The second, "Music in Our Time," was presented in Rome in 1954. The third, "East-West Music Encounter," took place in Tokyo in 1961.

then, much of the money for Con-

gress for Cultural freedom activi-ties came from the CIA. The reason for his ignorance of the true course of the money was that it was channeled through various was channeled through was channeled throug

Recently, Mr. Nabokov has been making plans for a Stravin-sky Festival to be beld in 1980 in Venice, where the composer is

Mr. Nabokov was born in the Minsk region of Russia in 1903. In 1911, his family moved to St. Petersburg (now Leningrad) and, after the Revolution, be went to southern Russia, where he studied musical composition with Vladimir Rebikov. Later, he went to Germany, where he studied at the Stutigart Conservatory and, from 1920 to 1923, at the Music Acade-

my of Berlin. He spent an extended period in Paris, starting in 1924 with study at the Sorbonne. It was in Paris that his professional career could be said to have begun with the Di-aghilev commission of "Ode." Mr. Nabokov settled in the United States in 1933 and became an

American citizen in 1939. Mr. Nabokov wrote two books of memoirs — "Old Friends and New Music," published in 1951, and "Bagazh," poblished in 1975.

Stephen E. Kelly

bia-Presbyterian Medical Center

pany, and was president of the Magazine Publishers Association, an industry group made up of 161 firms that published 595 maga-

Helmut Langfelder

MARSEILLES, April 7 (AP)-Helmut Langfelder, 49, director general of the West German air-craft maoufacturer Messer-schmidt Bolkow Blohm, died in a helicopter crash yesterday in this

city in southern France. He was on a test flight of a Squirrel belicopter which he was coosidering buying from its French manufacturer Aerospatiale. The French pilot was also killed in the crash, which officials attributed to engine failure.

Prisoner Amnesty Urged in El Salvador

SAN SALVADOR, April 7. (AP)—A group of lawyers has asked the National Assembly to grant amnesty to farmers arrested during an Easter week uprising in

which 30 persons died. A statement signed by 10 lawyers and 8 law students said that, since the uprising was political, NEW YORK, April 7 (AP)—
Stephen E. Keily, 58, long a figure
in American magazine publishing,
died of cancer yesterday at the
Harkness Pavilion of the ColumNEW YORK'S

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An urgent appeal to Americans to help clean up this mess.

It's off the front pages Min

The whole world is aghast at the extent and the impli-cations of the 220,000-ton oilspill.

And much of the world has already lent support

to the clean-up action. The Germans have sent pumps and other technical equipment. So have the Durch. Spanish fishermen have sent small boats. Money has come from as far away as Hong Kong and Indonesia. French school children and Belgians are in Brittany right now, helping to clean the beaches and to save wild life. Surely Americans are as appalled as others. They

must want to help. Perhaps they don't know how. To help Americans, French and others (individuals and companies alike) who want to lend a hand, the American Chamber of Commerce in France is sponsoring and acting as a clearing house for a fund raising project entitled "Franco-American 1978 Project Brittany". This effort has the unqualified endorsement of all leading Franco-American organizations in France.

In response to our urgent request the World Wildlife Fund - U.S. and the Fondation de France have opened special accounts in Washington and Paris to receive the contributions which will be used to help

Space for this appeal donated by the International Herald Tribune.

rehabilitate the beaches, to save marine life and to save the lives of tens of thousands of birds which have been endangered as a consequence of this disaster. Contributions of every size are needed

To qualify as a charitable contribution under U.S. income tax rules checks in U.S. dollars should be made out to the order of: "World Wildlife Fund - U.S." All other currency checks should be made out to

the order of: "Fondation de France". Contributions to the Fondation de France qualify as charitable contributions for French income tax purposes. All checks should be mailed to:

The American Chamber of Commerce in France, Franco-American 1978 Project Brittany, 21, avenue George V, 75008 Paris. This is how you can actually do something about

This is how you can help clean up the mess! FRANCO-AMERICAN 1978 PROJECT BRITTANY

the tragedy of the French coast!

Photo: Paris-March, Jean-Claude Deutsch.

Theater in London-

Ayckbourn's Universe Is a Very Small World

By John Walker

L ONDON. April 7 (IHT)— sedentary as it is, thanks to his mastery of comic detail and the ed the comic absurdities of subursudden flurries of action around ban existence for an examination of small-town rivalries in his lat- farcical set piece that brings evest and extremely funny comedy erything to "Ten Times Table" at the Globe conclusion.

Provincial living turns out to be invest familiar characters with a suhurbia with claustrophobia, a genuine humanity, showing how small, enclosed world where everyone knows everyone else's given the right circumstance, business and where trivial matters grow into full-hlown absurdity. can become magnified into national issues of life-and-death importance. Not that in Ayck-bourn's universe, hleak beneath its cosy comedy, there is much difference between one state and the other. Life is death with a little oxygen added.

As usual, Ayckbourn's play is a Eddington as the amhitious hut solution of a difficult technical easily brow-beaten chairman, Juproblem. He sets his action in a hotel ballroom-captured in all its dusty lack of glamour in Patrick Robertson's set-at a series John Salthouse's surly Marxist of committee meetings of a group schoolteacher, Benjamin Whitrow organizing a historical pageant to as an obsessional committee man commemorate a dubious 18th- and Matyelok Gihbs as his deaf century incident in which local but sprightly mother, Christopher farmers proclaimed revolutioo Gibbs as a twitching dog breeder and were shot for their defiance. Gibbs as a twitching dog breeder who develops alarming paranoia,

There are moments, as lights seeing the pageant in terms of an fail and workmen hammer, when international Communist takeit seems as if the self-imposed re- over, and Diane Bull as a speechstrictions of the play are too less helper. much for Ayckbourn's inventioo Even wh and that he is relying on stock sit- familiar ones-such as the deaf uations to carry him through. But these moments soon pass.

When directing his own play, bourn makes them seem fre be rarely lets the action seem as his masterly sense of timing.



A scene from "Ten Times Table" by Alan Ayckbourn which is on view in London.

sense of proportion. The bleakness of his vision comes in those small revelations of character that suggest people living lives of the quietest desperation—Julia McKenzie's joy, in the final uproar, when she is seized and borne off by a drunken reveler, says much of her marriage and explains her bullying manner to her husband—"When I elected you chairman," she hegins ooe

The Shaw Theatre, with commendahle enterprise, is reviving Arnold Wesker's three plays oow known as the Wesker Trilogy, which, as playwright John Witing pointed out many years ago, in-clines us to approach it "on the same emotional level as the Gos-

speech-and to her friends.

Even when the situations are pels. Or the Forsyte Saga."
The first, his 20-year-old "Chicken Soup With Barley," has particularly evangelical tinge about it. What is fascinating is

not only the play itself, which

His comedy is about a loss of a stands up well despite its clumsy construction, but the difference ess of his vision comes in those between it and more recent Socialist plays.

> "Chicken Soup With Barley" charts over 20 years the disinte-gration of a London East End Jewish family, symbols of a wider ideal of hrotherbood and sisterhood. From an early cohesiveness-all united to stop a Fascist march through the streets in 1936—the family and their friends drift away from the Communist party and a fervent belief in imminent political change until they end up dispirited and de-spairing in the 1950s.

> But even so, Wesker's play is basically optimistic. It retains a belief in idealism. The last words of the play are those of Sarah, the mother who has both held the family together and pushed them apart by her fighting spirit: "If you don't care, you'll die."
>
> And earlier, Sarah, faced with

> her soo who has lost his faith because of what bappeoed io Hun-

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gary, says, "Socialism is my light, you can understand that? I've got to have light and love." That sort of writing is more

than a generation away from the bitterness and anger of recent leftist plays, which are filled with hate or are a scream of pain at the injustice of society.

The elumsiness of "Chicken Soup With Barley" comes from the equation of the Kahn family's problems with those of the world. The domestic story of a strong wife trying to batter her way through to her weak husband and only forcing him into total isolation and early senility, does not always illuminate the wider social issues of the play.

It is, however, movingly acted by Barbara Young as Sarah and Martin Friend as her husbandand by Frank Baker as Ronnie, the son who fears that be may end up like his father. Anthony Cornish directs well and makes one eager to see the two other plays in the sequence.

-A Guide to the European Festivals-

PARIS, April 7 (IHT). — The following completes the listing of highlights of European musie and arts festivals that has appeared in the weekend editions of the International Herald Tribune beginning with March 4-5. Subsequent festival program information will be carried in the Arts Agenda:

Glyndebourne (May 28-Aug. 7): Opens this year with a new production of Mozart's "Magic Flute," conducted by Andrew Davis, staged by John Cox and designed by David Hockney. Other oew stagings are Mozart's "Cosi Fan Tutte," cooducted by the festival's new musical director, Bernard Haitink, staged by Peter Hall and designed hy John Bury, and Puccini's "La Boheme," with Bruno Bartoletti making his British opera debut as conductor and Cox as stage director, but with sets and costumes from the festival's 1967 production. Revivals of last year's stag-ing of Mozart's "Don Giovanni" and of Stravinsky's "Rake's Progress" complete the program in this small theater in a Sussex estate. (Glyndebourne Festival Opera, Glyndebourne, Lewes. Sussex BNg 5UU, England.)

Avignon (July 10-Aug. 7): The usual vast program in numerous sites in the walled city of the popes, including many oew works. Theater in the main courtyard of the Palais des Papes includes Brecht's "Caucasian Chalk

DIRECTORY

Yves Prin, and two programs by the Alwin Nikolais Dance Theater. Antoine Vitez is staging a cycle of four Moliere plays and Montreal's Theatre du Rideau Vert gives three pieces in the Cloitre des Carmes. Other musi-cal theater includes works hy Maurice Ohana, Lorenzo Ferraro and Monteverdi. There will be cycles of sacred music, organ music on instruments of the region, jazz, and an exhibition of 50 years of lithographs from the Atelier Mourlot. (Bureau du Festival, 84000 Avignon, France.)

Besancon (Sept. 1-17): The English Chamber Orchestra, the Orchestre National de France. the Camerata of Boston, the Ensemble Vocal et Instrumental of Lausanne and the Grande Ecurie et la Chambre du Roy are among the visiting ensembles. Programs will mark this year's Vivaldi and Schubert anniversaries, the tricentenary of the joining of Franche-Comte to France and Olivier Massiaen's 70th birthday. The 28th annual competition of young conductors and the sixth festival of musical and dance film are also scheduled. (Festival de Musique de Basancon, B.P. 1913. 25020 Besancon, France.)

Berlin (Sept. 8-Oct. 8): The circus and its descendants are Circle," Beckett's "Waiting for featured, with an exhibition, a Godot," a musical work, "Le film festival, circus companies

and related theatrical events. The Zurich Opera's Mooteverdi trip-tych heads the opera program Art and artists during the Nazi era will be the subject of an exhi-bition. The centenary of the birth of the Austrian composer Franz Schreker will be marked in concerts and a symposium. The Berlin Philharmonic will be conducted by Karajan, Boehm, Giulini and Abbado, and Dietrich Fischer-Dieskau and Maurizio Pollini will do Schubert's "Die Winterreise," heading a rich concert and recital program. (Berlioer Festwochen, Budapester Strasse 48%0, 1 Berlin 30.)

Warsaw (Sept. 16-24): The 22d festival of contemporary music in the Polish capital offers oumerous visiting ensembles from East and West Europe, among them the Scottish National Orchestra and the Lyric Arts Trio of Toronto, as well as programs of electrooic and computer music. Events are spread out from ooon to late at night. (Warsaw Autumn, 27 Rynek Starego Miasta, 00-272 Warsaw.)

Perugia (September): The 23d annual Sagra Musicale Umbra offers the customary programs of sacred and quasi-sacred music, including opera, choral, orchestral and organ music in Perugia and surrounding Umbrian cities (Piazza Italia 19, Casella Postale 341, 06100 Perugia, Italy.)

-DAVID STEVENS

111

100

person who can hear something

said when no one else can-Avck-

bourn makes them seem fresh by

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than a historical pageant which splits the organizing committee

into two factions, right wing and left wing, determined to fight out

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lia McKenzie as his bitchy wife

becoming more rabidly conserva-

tive with every confrontation with

the battle in earnest again?

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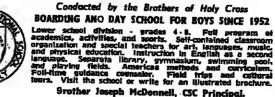
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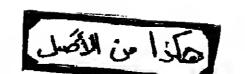
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The Confusion at Islamic Auctions

By Souren Melikian

ONDON, April 7 (IHT)-After a nine-day round of Islamic art sales which started in Loodoo March 29 with a carpet auction and ended yesterday with coins, the picture that emerges is one of continuing price confu-

The zigzagging prices go to extremes often unrelated to quality. This cames out strongly in the sales of manuscripts and minia-

The Tuesday sale held at Sotheby's offered some particularly striking contrasts. The items included Persian miniatures of the 14th to the 17th century, manuscripts of the same period and 19th-century oil paintings done under the Qajar Dynasty.

Lot 8, an excellent miniature painted in Shiraz io the last quarter of the 15th ceotury, was knocked down at only £198. Less than 10 minutes later, lot 21, a late 16th-century drawing of a youth standing io a landscape, badly stained and worth less, made considerably more at £462.

Soon after, some very good miniatures of the 19th century could be bought for ludicrously low prices. Lot 40, a fine miniature painted about 1820, could oot have been cheaper at £27.20. And lot 57, an excellent study of a wandering ascetic or dervish of the mid-19th century, was given

By Henry Pleasants

ONDON, April 7 (IHT)-

About halfway through the

first act of Bohuslav Martinu's

Julietta," giveo a British premiere by the New Opera Company

in association with the English

National Opera at the Coliseum.

ooe of the characters remarked:

"Everything's quite clear"—and

the bouse exploded with laughter.

thing was anything else but. For

this opera, dating from 1938 and

based on a play by Georges Neveux, notoriously controversial

in its time, is an adventure in sur-

realism, pure and simple. At that

point in the first act the audience

bas not had time to come to

terms with the fact that what was

afoot was a dream, and that what

was up might well be down-or

That first act, in which our

hero, Michel, finds himself in a

vice versa.

"Clear" was just what every-

nway at £38.50, the price paid by the earliest miniatures from a fa-lranian dealer Motamed of mous manuscript of the mid-14th

Frankfurt.

Since Qajar art has been much less in demand of late, these low figures might have been understandable if the oil paintings of the same period had oot been selling for huge prices. A portrait of the eldest son of King Fith Ali Shah, painted in 1814, went up to £66,000. The signature of a wellknown artist called J'afar and the historical interest of the portrait partly explain this price, but they do oot make up for the dull color scheme. Another portrait of King Fath Ali Shah himself, done in the same year by the famous court artist Ali, rose to £104,500.

a fabulous price. Ironically, the finest painting, a portrait of a woman playing the lute, was the cheapest of all. Unsigned but attributed by several Iranian connoisseurs to the painter Mirza Baba, it was bought for £35,200 by Tehran collector Samad Khorshid.

On the following day, the price of £6,600 paid at Christie's for a dagger and matching scabbard in polychrome enamels showed that, indeed, the Qajar market is still doing very well, making the uoderpricing of the miniatures all the more paradoxical.

Similar vagaries, bowever, could be observed in virtually every category.

Music: Martinu's Surrealist Adventure

amnesiacs, where be alone has

who, at the intermission, reported

difficulties in fighting off dreams

But a second-act idyll with an

unpredictable Julietta in a kind of

magic forest-enlivened by a gyp-

sy fortune-teller who foretells the

past-has seductive charm. A last

act, set in the central office of

dreams, with our bero reluctant

to awake, and finally opting for

further pursuit of the elusive but

ubiquitous Julietta in dreamland

as preferable to the bumdrum of

reality, exercises an irresistible

Spoken Text

from the fact that much of the

text (in English) is spoken, quite

enough of it, indeed, to demon-

small coastal town inhabited by strate that nothing is gained in Roberts as Michel and Julietta.

This last act benefits greatly

known historical chronicle. On Mooday at Sotheby's, one And bere, indeed, lies one of

any remembrance of anything, is kind of singing that, while pro-

a trying 45 minutes, and there duced by singers, is certainly not

were those among the audience song, and is not only less intelligi-

mous manuscript of the mid-14th century went up to £110,000. That is rather a lot, given the amount of restoration work, and it might suggest renewed interest io that transitional period of Persian miniature painting. This assumption is, however, belied by the low price of £1,900 paid for a page of the same period with a fine miniature cutting across the page in horizontal format. Fine Manuscript On the following day at another auction of miniatures, also

held at Sotheby's, some pieces

were mysteriously overlooked,

such as an outstanding manu-

script of the poet Jami's works, dated 1504. This was only 19

years after Jami's death, making

it an important manuscript for

future critical editions. The su-

perb calligraphy and illumination

strongly suggest that it must have been prepared at Herat, Jami's

city. At £990, it was a giveaway.

Even more astonishing was the price of £825 for a miniature il-

lustrating a battle. The style

leaves little doubt that it was

painted by, Mohammad Mo'in, a

famous artist of the second half

of the 17th century. The cata-

logue was silent on this score, nor

did it properly identify the sub-

ject, which was taken from a well-

the composition of opera by a

ble, but also, in the end, less mu-

As is true of most operas com-

posed since "Turandot" (1926).

the musical action is in the

orchestra, as incidental music to a

play, or as a kind of underscore,

finely wrought and highly effec-

tive, especially as played by the

ENO Orchestra under Charles

Mackerras. "Julietta" would have

worked better, come to think of

Anthony Besch's production,

with appropriately surrealistic

the Coliseum, including many ad-

mirable characterizations in sup-

porting roles. And there are

splendidly sympathetic perfor-

mances by Stuart Kale and Joy

sical than speech.

it as a ballet.

Portrait of a lute player which sold for £35,200.

of too many fakes and, above all. retouched paintings or heavily made-up objects. The other is the weakness of auction-room cata-

There were some surprising bloopers in the Islamic Week's catalogues. In Sotheby's Tuesday sale, a manuscript of S'Adi's works executed in 1496 is located in "Turkey," while the page reproduced in the catalogue carries the final inscription specifying it as copied at Qazvin, northwest of Tehran. In the same sale, charming Qajar miniature portrait of a woman had a caption in Persian identifying it as the portrait of a woman from Sivand, a well-known village of the Shiraz area. The catalogue assures us that the inscription calls her "the wife of Siwand Tardik of Shiraz."

Doubtful Signature At an auction conducted last week in Paris fine Koran was said to be by "Nishapouri." No such name was to be read in the Koran and this is oot a complete signature anyway. At least three calligraphers include this word in their full

Most unexpected, however, sets by John Stoddart, has all the was the misreading of a cartouche inlaid in gold on the steel blade virtues ooe has come to expect at of a sword sold at Sotheby's Monday. The Arabic inscription, "I have entrusted myself to God," often seen on weapons, was read as "Kalb Ali," who, the catalogue goes on, "is said to be

the two basic causes of the uncer- the son of Asadallah of Isfahan tainties and unhealthiness of the the most prominent bladesmith market. The first is the existence in Persian history." The 19th-century look of the calligraphy and the strongly Turkish appearance of the scabbard might have warned the cataloguer that he badn't got it quite right.

Sooner or later, these little mistakes get known and deter most Western buyers. And Eastern buyers bave become both considerably more discriminating in their buys and more sophisticated in their approach to the market and its many traps.

By far the best manuscript in London, an outstanding Book of Kings illustrated with 62 miniatures painted in Khorasan in 1602, was bought for £341,000 by a well-known collector, Mas'udi of Tehran. It is a key work for its period and ooe of the finest of that school, which makes the price acceptable.

The presence of Middle Eastern dealers is now becoming overwhelming. The latest European gallery specializing in "Islamic and Persian art" was maugurated on Tuesday on Clifford Street, a few steps away from Sotheby's, by Naser Khatili of Tehran.

In the middle term, this presence could lead to a more perceptible connection between price and quality. But it also introduces a further element of instability. The slightest threat of unrest of any nature in the Middle East could be enough to halt purchases from the area and precipitate a market crisis.

Around Paris Galleries

tural Center, 3 Rue du Dragon,

Maurice Sendak is an illustrator of exceptional value who has succeeded in preserving the best qualities of his 19th-century predecessors while giving his drawings the freshness of modern attitudes. Parents looking for books for small children gratefully discovered the "Little Bear" books, for instance, in which the story and the illustrations are perceptive, imaginative and warm. Sendak joins Beatrix Potter Shepard, the illustrator of Winnie the Poob and other books, in the ranks of the tender, gifted, inconspicuous benefactors of mankind. . . .

Gilles Ailland, Galerie Karl Flinker, 25 Rue de Tournon, Paris 6,

to April 27. Aillaud's subject is the zoo, and at first sight he seems to treat it with an unusual, sub-photographic detachment. The cages and pits in which the animals are enclosed are sinister—the paintings themselves often present one with effects of unexpected beauty, nonetheless—and the animals are no more than inert and shapeless heaps of fur or skin in many cases. Is that a seal, or a large garden slug? But that is, of course, the way we actually do see some animals on occasion. Aillaud's intentioo becomes apparent through the very persistency with which he pursues it. As a painter he is a very good craftsman, but he is also a man with a message for the mind. Nor is it a simple. message. His zoo is like some sort of encyclopedia where living creatures are captives in cement slots. Here we have a hippopotamus (a

Poussin Painting Permanently Flawed

LONDON, April 7 (AP)—Nico-las Poussin's "The Adoration of the Golden Calf," slashed by a vandal in the National Gallery, is permanently flawed, a gallery

spokesman said today. Salvatori Borzi, 27, an Italian, is being held on charges of criminal damage to the 17th century French painting, which was val-ued at nearly \$1 million. The gallery sookesman said that although the picture "can be repaired it will no longer be possible to regard it as a complete example of Poussin's art at its greatest."

Maurice Sendak, American Cul- first-rate painting). You don't see much of the animal really, but then, a real hippopotamus is not only that gray body, vanishing under the sumptiously filthy water-it is also the Nile. Aillaud's theme seems to be the reductive violence man exercises on words, concepts (animals perhaps) and other men. This is a suprisingly paradoxical ocuvre which Aillaud has been singlemindedly producing since at least the past 15 years, until the very oddness be conveys begins to fill with meaning and we begin to no-

> Realisme et Poesie dans la Peinture Russe, Grand Palais, Paris 8, to May 15.

An exhibition of 86 paintings illustrating, sometimes with considerable charm, the directions taken by Russian painting be-tween 1850 and 1905. The public outside Russia has had little opportunity to discover the works of artists who shared the preoccupations of a Dostoevski or a Tolstoi. The half century covered by this show was one of profound change, and the art movements themselves show an interesting diversity. One of the prime forces

was the Society of Traveling Ex hibitions set up by a group of are ists in 1870 with the intention of developing the people's love for art while reflecting the serious in terests of the people. Russian art ists, on the whole, seem to have had a defensive attitude toward Western influences during that period, and it would be a mistake to assume that formal similaritie between some Russian and West ern paintings reflect a similar out look. In any event, there is much to charm one in this show, a strong love of light and nature it many works, (Chickin, Iarochen ko). The historical painting themselves, so tedious in th French School of that period have a certain power of persua sion (Surikov, Schwartz). A num ber of artists dealt with curren events (Repin) or tragedies o daily life (Perov, Ivanov) in a sur prisingly sober manner. -MICHAEL GIBSON

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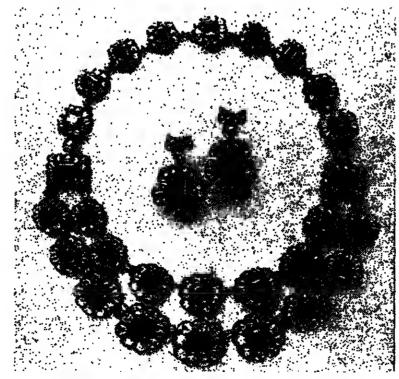




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(Continued on Page 10, Col. 1)

PARIS, SATURDAY-SUNDAY, APRIL 8-9, 1978

Indonesia Role Dim As Future Oil Power

By George McArthur

cant oil exporter far sooner than had been expected, sources say.

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The country, now the ninth-ranked producer among the 13 members of the Organization of the blame on President Subarto Petroleum Exporting Countries, could be a net importer of oil within 10 years, at least two oil industry surveys and a study by U.S. economic experts indicate, the sources say.

Indonesia's questionable prospects are also depressing hope for a revival of the Southeast Asian oil boom which collapsed in 1975-1976. Oilmen are convinced plenty of oil remains to be found, bot the future pace of exploration and development is likely to be cau-tious and complicated.

Incentives Low

The potential is high but incentives are low, says Allen Hatley, regional executive for Cities Service and chairman of the Southeast Asia Petroleum Exploration Society. lo a paper he delivered to a regional oil conference, be said that a major reason for the oil

Japan Surplus Seen Continuing

TOKYO, April 7 (Reuters)-Japan's economic planning agen-cy (EPA) said today there is no visible sign of a decline in the country's current-account surplus.

Export volume on a customs-cleared basis rose in the first two months of this year-2.9 percent in January and 5.6 percent in February-after being about unchanged in the final quarter last year compared with the third quarter, its moothly report said. But the agency's monthly re-

bright spots in the domestic economy following active government capital spending for public works. It warned, however, that a further ration, production peaked at 1.7 appreciation of the yen could undermine the economic recov-

try said the cabinet has decided to try to place about 73 percent of its public works spending in the first half of the fiscal year and

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percent target in real economic some major concession." growth for the current fiscal year. This higher growth rate would ready run out," an industry exalso help Japan cut its current-ac-pert says. He ooted that for the count surplus to \$6 billion in the most part, oil companies explorafiscal year, it said.

W. German Oil Imports ESCHBORN. West Germany.

April 7 (AP-DJ)—West Germany's crude-oil imports fell 1.7 percent to 97.5 million tons in 1977 from 99.2 million tons in 1976, the government said today. This compares with a 10.2-percent rise about 11 billion barrels, Inlast year. North Sea oil supplied donesia does not have a very large 10 percent of the country's crude cushion. oil requirements.

SINGAPORE, April 7—In- boom of the early 1970's was the donesia may cease to be a signifi- momentum and flexibility that grew from sustained exploration throughout the area. This "is rap-

> of lodonesia and, to a lesser degree, the government of Malaylo 1975, with Indonesia's stateowned oil company Pertamina in a \$10-billion jam from what it lat-er termed "uncontrolled" man-agement and overspending Mr. Subarto needed money badly.

Broken Contracts

He unilaterally broke his contracts with all major oil compa-nies—some only a year old—and imposed a 85-to-15 percent production split and imposed stiffer cost-recovery terms. Previously, the government took only 65 percent of the profits, after deductions for recovery costs, with 35 percent going to the companies. Within the complex pricing-system of the oil industry, most companies found this bearable.

However, they complained vig-orously, but unsuccessfully, that the new split did not provide in-centives for exploration. And in Indonesia, most discoveries are relatively small, have a production life of about 5-to-10 years and continuing exploration is an

As a result, exploration dropped to cearly nothing. At one point, only four new wells were being drilled—all in proven

Malaysia may suffer the same fate. The new government oil company, Petronas, openly fash-ioned on the Indonesian model but with far less expertise, imposed the same production sharing percentage. Moreover, it tried But the agency's monthly re-to get greater management con-port said that there are now more trol through some share-juggling proposals. Exploration came to a virtual standstill there, too.

While oil companies cut explomillion barrels a day late in 1977 in Indonesia, and it was estimated the government's oil-export earn-

Time Has Run Out

In mid-1977, Mr. Suharto atparticularly in the April-June tempted to stimulate oil exploratioo by offering marginal incen-The fiscal 1978 budget, which tives oo things such as depletion received legislative approval this allowances and pricing details. In week, earmarks 6.5 trillion yen January, be tried again. He called (about \$30 billion) for governin oil company executives from ment public works spending the United States, Japan and Eu-With expenditures of public cor- rope and told them Indonesia was porations taken into account, the seeking "mutually beneficial" retotal amounts to 11.8 trillioo yen, lationships in new contracts. There was no public response The decision follows the gov- from any company. Diplomats ernment policy to promote public based in Indooesia say Mr. Suharworks spending to stimulate do- to now realizes that "time is runmestic demand and achieve the 7- ning out and that he must make

"I'm afraid that time has altion budgets have been set for this year, with very little provided for exploration in Indonesia. That would mean three years without new oil being found in any significant quantity.

tion. With proven reserves of only

O Los Angeles Times

Ocean Mining Profitable, Computer Model Shows

CAMBRIDGE, Mass., April 7 (AP-DJ)—Deep-ocean mining of key minerals could be profitable, according to scientists at the Massachusetts Institute of Technology.

In a report to MIT's Sea Grant program, scientists say mining

the ocean floor could yield a long-term return on investment of 15 to 20 percent. The idea is to scoop, or vacuum, ferromanganese nodules from the sea floor. Such nodules, averaging about the size of tennis balls, are found in abundance, particularly in some parts of the Pacific Ocean, the report says. By running data through a computer model of such a mining

venture, the MIT group reckons annual revenue through the sixth to 30th year might be about \$250 million after operating expenses of \$100 million. They also figure the recovered nodules would contain about 1.5 percent nickel, 1.3 percent copper, 0.24 percent cobalt and 26.9 percent manganese.

The study was compiled by MIT students under the direction of J.D. Nyhart, an associate professor of management at MIT's Sloan School of Management.

The purpose of the model is to enable governments and companies to analyze bow various policy options and economic factors could affect a deep-sea mining venture.

Although the model is flexible and able to use a variety of different assumptions, the basic venture it is concerned with involves a "mine site" about 18,000 feet below sea level, about 2,640 miles from the nearest port with about two pounds of nodules per square

The venture would require investment of about \$560 million before it began to return any income from the sale of refined minerals. According to the report, four concerns have spent an estimated \$100-to-150 million on ocean prospecting, exploration and research and development.

Members of these groups included affiliates of U.S. Steel, Sun Oil, Kennecott Copper, Inco Ltd., Standard Oil of Indiana, Royal Dutchhell group and Lockheed, among others.

Stocks Gain In Active **NYSE Trade**

Robert Tuck jr.

PEOPLE IN BUSINESS

Detroit Diesel Allison, a division of General Motors, has named Robert Tuck jr. as manager of European operations with headquarters in Rotterdam. He was formerly based in Michigan.

Peder Bonde, formerly deputy chief executive of the Skandinaviska Enskilda Banken and the Salen shipping group was appointed president of the Banque Scandinave en Suisse. He is replacing Didrik Hamilton who is retiring. Thomas Goossens, previously vice-president of Deltec Banking Corn in Nassau was applied 1% to 36. Superior Oil six Banking Corp. in Nassau, was ap-pointed senior vice-president.

Swiss Banker Convicted For Fraud

BASEL, April 7 (AP)—A Swiss banker was sentenced today to three years in prison for fraudolently manipulating "numbered accounts" of for-eign clients. Arthur Krieg, 54-year-old former Basel-branch manager of the Amexco Bank, convicted after a six-week trial held largely behind closed doors to protect the clients' anonymity, was found guilt of embezzlement, forgery and criminal mismanagement that lost the bank 6.5 million francs (about \$3.8 million).

A key figure at the trial, according to court sources, was an internationally known forcign-exchange dealer who specializes in transactions for customers in East Europe. Judges referred to him as "Monsieur Agent X." Krieg denied the embezzle-

ment charge but admitted be engaged in risky operations aiming to recover losses his clients suffered because of unsuccessful speculation. The prosecution charged that Krieg kept about 1 millioo francs for himself. His lawyer portrayed the defendant as an ambitious banker who had been under "performance pressure" by his U.S. bosses and resorted to illegal dealings to hide his mability.

U.S. Adopts New Goals For Stategic Stockpiles

WASHINGTON, April 7 (AP-DI)—The Carter administration has adopted new goals for stock-sugar and that "advanced discushas adopted new goals for stockpiling strategic commodities that require large acquisitions and in some cases, disposals," Fred Bergsten, Assistant Treasury

Secretary said today.

"It will take several years to fulfill these goals," Mr. Bergsten said while speaking at an American Mining Congress conference in Phoenix. "Thus, the requests for approvals of acquisitions and disposals which have been transmitted to Congress for fiscal year 1978 through 1980 are only a beginning."

"For example, tin disposals are now scheduled for no more than 45,000 tons, though 167,000 tons of tin now in the stockpile are considered surplus. Similarly, leg-islative authority is currently pending for the purchase of up to 225,000 tons of copper, far below the goal of 1,299,000 tons," he said. "The administration is also supporting the principle of using proceeds from sales of surplus materials to purchase deficit materials," he said.

Commodity Agreements

"We are willing to hold these funds in a separate account for about two years. However, we op-pose holding such proceeds indef-mitely in escrow to fund future purchases. Such a procedure would violate accepted budget practice by tying up idle funds" for several years, be said.

Mr. Bergsten also outlined the administration's views on international commodity agreements. He said that "only a handful" of such agreements oow seem feasible.

Fed Report Calms

Volume totaled 25.16 million yesterday.
Advances led declined 846 to

Airco, delayed at the opening

to 37% and Centex 1% to 14%, Electronics stocks were strong with Teledyne up three to 791/2, Texas Instruments 1% to 67%

Amex Index Record

The Amex market-value index rose 0.96 to 131.81, a oew 4½

stantially higher, corn and soy-beans irregularly higher and oats higher on the Board of Trade.

triggered an active supportive mood across the floor. Commercial buying dominated say in wheat and soyoil, the latter also in attracting support from commis- the administratioo's recent deci-

of U.S soybeans and corn. The tributing to delays in the deploy-outside markets were higher. the tributing to delays in the deploy-ment of trident ballistic-missile

South Korea Reserves

SEOUL, April 7 (AP-DJ)— South Korea's foreign exchange reserves fell \$118 million in March from the previous month to \$4.258 billion. But this was up \$1.06 billion from a year earlier, the Finance Ministry reports. The second consecutive monthly decline was attributed largely to repayment of short-term foreign loans.

sions are under way" on wheat natural rubber and copper.

despite the fact that proposals for

international commodity agree-ments have been put forward by some of the producing countries.

Tighter Credit Fears

NEW YORK, April 7 (1HT)— Prices on the New York Stock Ex-change rose slowly but steadily from a mixed beginning to finish broadly higher in active trading. Analysts said investors were pleased by the money-supply figures released yesterday showing a much smaller gain than expected, iodicating the Federal Reserve Board might not have to tighten credit as much as had been

In addition, they said the market's ability to eke out a small gain yesterday despite disquieting news on inflation was a hig plus. The Dow Jones industrial average gained 5.63 to 769.58.

shares, down from 27.36 million

rose 5% to 49% and Martin Mar-ietta gained % to 26%. Talcott National rose % to 4%

gained 1% to 36, Superior Oil six to 251, Vornado 1% to 104, Ansul 1% to 10%, Becton Dickinson 1%

Memorex 1% to 35% and Applied Digital Data one to 15.

American Stock Exchange pric-

es closed sharply higher in active

In Chicago, wheat closed sub-

Good export sales in corn and soybeans, and rumors of possible wheat business with China

sion bouses.

Earlier rumors influencing the market mention China and the Soviet Union as potential buyers

sion to scale down the Navy's long-range shipbuilding plan. In addition, they concede that problems with the submarines are con-

Car Workers Reject Leyland Bonus Plan

sure that the company, which re-cently reported record 1977 earn-

ings, is in good financial health

claims was cootinuing.

In response to the Navy's announcement, General Dynam-

ics said it would wait until June 12 before halting the submarine work. Meanwhile, delivery of the

16 submariness still to be built is

Defense Department officials

the program were a factor in

submarines, which are also being

Some Pentagon officials also

built by General Dynamics.

running up to 3½ years behind schedule.

say the cost overruns and delays

LONDON, April 7 (AP-DJ)— Workers at the car division of British Leyland have rejected by a 2-tol margin a scheme for productivity bonuses of up to £8 a

"For other products, such as tungsten and jute," Mr. Bergsten said, "we're extremely dubious" Leyland had offered the plan in a bid to increase lagging output following a company finding that productivity in the division is only 45-to-65 percent of that achieved by other major European car makers.

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FINANCIAL NEWS AND NOTES

VW to Boost Dividend, Raise Capital

Volkswagen plans to increase its dividend and raise 900 million Deutsche marks in oew capital through a 3-for-1 new share offering. The shares, having a nominal value of 50 DM, will be sold for 150 DM. This will raise the company's nominal capital 300 million DM to 1.2 billion DM. The automaker plans to increase its dividend to 7 DM per share from 5 DM paid in 1976 and also pay a bonus dividend of 1 DM. The capital increase is the first since 1970. The company did not give any indication of profit or turnover for the year. In 1976, it reported a net profit of 1.004 billion DM on group turnover of 21,42 billion DM. VW gave no details of how it would use the capital increase, although it has previously reported that it plans to boost investment spending in the next four years to 4.9 billion DM from 2.3 billion DM originally

Airco Agrees to Takeover by BOC

BOC loternational Ltd., ending its bitter takeover dispute with Airco, plans to make a \$50-a-share tender offer for all of Airco's outstanding common stock. The offer will be made "at the earliest practicable date" and has the approval of

the Airco board which rejected a similarly-priced offer from Martio-Marietta. Marietta acquiesced saying it has no intention to enter a biddiog contest. An insurgent majority of the Airco board had attempted to arrange a merger with Martio-Marietta to block BOC, which already owns 54 percent of Airco. BOC acquired 1.8 million Airco shares, at \$43 each, through a tender offer in January. Those who tendered their holdiogs at that time are to receive a further payment of \$7 per share from BOC upon the completion of the cur-rent tender offer. BOC and Airco, both makers of industrial gases, have agreed to drop various law

Toshiba, Rank Organisation to Link

Tokyo Shibaura Electric, maker of Toshiba appliances, plans to extend capital and technical assistance to the Rank Organisation of Britain. A spokesman for the Japanese concern says negotiations for the deal started last autumn when Rank Radio International Co. sought Toshiba assist-ance for the production of color television sets. Rank is a major movie, optical and electronic-in-strument maker which holds about a 10-percent share in the U.K. color-television-set market.

Pentagon Fears Wide Impact

General Dynamics Feud Worries U.S.

NEW YORK, April 7 (AP-DJ)—A long legal battle between the Navy and General Dynamics despite the submarine-contracts Last year General Dynamics over contracts totaling \$1.8 bilhad a 4-percent increase in net inlion to build 18 ouclear subma-rines is making Pentagon officials increasingly concerned about the come to \$103.4 million, or \$9.51 a share. The company has not paid a dividend since 1970. One reason is that it has spent about \$400 million of its own money on the long-term impact on other desubmarine program. The compa-ny has indicated it would be in-clined to resume paying a divi-dend if the contract problems These worries surfaced recently when General Dynamics-after three years of unsuccessful at-

tempts to renegotiate terms of the could be resolved. money-losing contracts—an-nounced a decision to stop work The dispute over the submarine cootracts is part of a broader cooon the boats at its electric boat divisioo on April 12. flict between the government and shipbuilders. The Navy is pro-cessing \$2.7 billion of contract claims, filed by its major ship-builders—General Dynamics, Yesterday, bowever, the Navy announced it would pay General Dynamics \$66.5 million as part of Newport News Shipbuilding & Dry Dock, a unit of Tenneco, and provisional settlement of cost overrun claims. The Navy also said review of cost overruns Litton Industries.

U.S. Money Growth Below Expectations

NEW YORK, April 7 (Reuters)—U.S. money-supply growth during the latest week continued to fall behind expectations, leading analysts to reassess expectations of an imminent tightening in the government's credit policy. For the week ended March 29,

the Federal Reserve reported a rowly-defined moocy supply, about \$1-billion less than many projections. Even with the latest increase, the M-1 growth rate in the first quarter was 4.2 percent. The rate

worry that severe losses by Gener-al Dynamics on its submarine declined slightly to 4.9 percent work could jeopardize the compafrom 5.0 percent a week earlier. oy's ability to perform on other important defense cootracts, including the Airforce's F-16 fighter only about 2.4-percent above the program and development of the new cruise missile.

General Dynamics officials assure that the company, which re-

the Fed's interim target levels, and are below the looger-range growth objective of 4-to-6.5 per-

sure to settle with Geogral Dynamics because it is paying a heavy price for the submarine problems. The Navy says General Dynamics, to help cut losses on the submarines, diverted man-power from the important program for trident strategic-missile submarines. As a result, the tridents are running up to 18 months behind schedule, and the first boat is expected to cost \$1.2 billion, 50-percent more than

The Navy is under great pres-

Jobless Rate Up To 6.2% in U.S. WASHINGTON, April 7 (AP-

DJ)— The U.S. unemployment rate rose to a seasonally adjusted 6.2 percent in March from 6.1 percent in February, the Labor Department said today.

The increase was the first since

August, when unemployment elimbed to 7 percent. Higher unemployment among black women and black teenagers was the main reason for the March rise. Despite the increase, the department said the total unemployment picture was "little changed" last mooth. A spokesman said the

March rise was due to "rounding up the oumbers." For the first quarter, the unemployment rate averaged 6.2 percent, compared with 6.6 percent in last year's the fourth quarter

and 7.4 percent a year earlier. A breakdown by race shows that the job picture for whites was unchanged with an average unemployment rate of 5.3 percent. Black unemployment rose from 11.8 to 12.4 percent with all the deterioration among women and

White House Press Secretary Jody Powell said that "we clearly are disappointed with the rise in black unemployment" and added that the administration will contioue to "pursue a policy of dealing with inflation and unemployment at the same time.

Growth Flat In Quarter, Official Says U.S. Rebound Seen

Page 9

Later This Year

WASHINGTON, April 7 (AP-DJ)—The U.S.gross national product was flat in the first quarier of 1978 while labor costs were rising, but there will be a rebound in the second quarter, Carter Administration officials forecast

The first-quarter GNP in con-stant dollars probably was little changed from the previous quarter, Courtenay Slater, the Com-merce Department's chief econooust said today.

She said her preliminary judgement on first quarter growth— even considering the bad weather and coal strike—is that it "would have fallen short of the 4-to-5 perceot annual rate which we would like to have seen."

Mrs. Slater, speaking before the Joint Economic Committee of Congress, said her comments reflect her own judgment based on the limited data that is available. First-quarter performance "obst-ously is disappointing but our expectations continue to be for strong growth of GNP during the remainder of the year."

Rapid Growth Needed

She said it must be rememhered "however, that extremely rapid growth in the remaining quarters of 1978 would be necessary io order for earlier growth forecasis for the year as a whole to be fully met."

Labor Statistics Commissioner Julius Shiskio said the economy is doing well, but he sees continued reduced productivity looming as an obstacle to expansion. Mr. Shiskin told the committee

that last year, productivity grew 2.6 percent, down from 4.2 percent in 1976. He said this helped boost growth in unit labor costs to 6.1 percent from 4.7 percent. He said it appears there will be a "decline in productivity for this year's first quarter with an attendant increase in unit labor costs." But continued employment force; "increases lodicate that employ-ers are gearing up for an expected economic rebound that is Likely in the second quarter."

Mrs. Slater told the panel that she also expects the economy to bounce back during the second quarter, noting available prelimi-nary data iodicates consumption expenditures for goods were weak in January and February followiog an abnormally strong fourth

She said despite a surge in March, unit sales "of automobiles for the first quarter fell below last year's fourth quarter." She said business fixed investment expenditures in the first quarter were held down by lower business automobile purchases and by re-duced construction activity. She added that bad weather caused a "reduction in first-quarter residential construction while real disposable income probably was esseoually unchanged."

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NYSE Nationwide Trading 3 p.m. Prices April 7

43 | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + | 19%+ + LongDr 56 LoralCp 80 Lolund 1.20 LoPoc 40b LouwGs 1.96 Lowerst Lubrzi 1.30 Lucky5 .84 Ludiow .40 Lukens 1.60 Lykes Lyke pf2.50 Lykes pf2.50 LynCSys .40 18%+ %
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34. Ask a lot

(An international call means business.) Long Distance is the next best thing to being there.

TENDER NOTICE

REPUBLIC OF TUNISIA

Ministry of Industry, Mining and Energy AGENCE FONCIERE INDUSTRIELLE 5, rue Robespierre, TUNIS Tel.: 288.133. Telex. 12554 AFIN.

INTERNATIONAL TENDER NOTICE

The "Agence Fonciere Industrielle," an industrial and business ariented public company, is launching an international call for bids on the wark on allotment n° 3 - curtain wall - in connection with the building of the future headquarters of the Agence de Promation des Investissements and the Agence Fonciere Industrielle, on avenue Mohamed V in Tunis.

The wark particular to this allotment includes manufacturing, transporting, supplying, installing and testing the modular elements in alumi-num and glass assembled onto the reinforced concrete structure of the building.

Specialized companies qualified for and interested in this project are required to go into partnership with the Tunisian company of their choice for the wark that can be done locally.

The technical and tender files can be withdrawn as of April 15, 1978 at the headquarters of the Agence Fonciere Industrielle, 5, rue Robespierre in Tunis. A security deposit of 1000 DT (one thousand Tunisian dinars) will be required. This deposit will be immediately returned to all firms whose tender offer is not accepted.

Upon publication of this notice, interested firms are requested to submit their application to the Board Chairman of the Agence Fonciere by letter, to which should be attached a copy of the certificate of qualification and a list of referenc-

Additional information regarding this tender notice can be obtained from: La Direction des Etudes, Unite de Programmation et Conceptian. Agence Fonciere Industrielle, 6, rue Imam Rassaa, Tunis. Tel.: 287.386.

Selected Over-the-Counter

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U.S. Commodity Prices NEW YORK. April 7— Cash Mary prices in primary markets as regis Sales: 2,550.

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LIVE BEEF CATTLE (40,000 bb.1
Apr 53.70 54.05 53.45 53.50 + 58
Jun 52.85 53.05 52.35 52.40 + 78
Aug 51.60 51.80 51.45 51.80 + 38
Oct 50.70 51.25 50.45 50.75 + 53
Dec 50.70 51.25 50.45 51.60 + 30
Feb 50.40 51.80 51.84 50.82 + 46
Apr 50.50 51.80 50.50 50.65 + 40
Jun 51.80 51.90 51.45 51.82 + 45 DRANGE JUICE 15,400 Bbs.; cents per 8b.
May 117.50 118.75 118.55 117.75 +1.00
Jul 114.20 114.20 113.70 115.75 +1.15
Sep 113.30 114.85 112.69 114.69 +1.85
Nov 107.60 108.50 107.30 108.30 +0.50
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May 88.85 90.18 88.85 89.20 +0.55
May 88.00 88.00 88.00 88.00 Sales: April 4816; June 7972; Aug 3886; Oct 2280; Dec 1841; Jan 90; Feb 768; Apr 240; June 176.

Open Interest: April 10645; June 26079; Aug 1587; Oct 8641; Dec 10207; Jon 1555; Feb 6432; Apr 2591; June 845.

LIVE HOGS (28,898 lbs.)

Apr 47.35 47.76 47.92 47.52 + .35

Jun 52.47 52.57 51.85 52.15 + .18

Jul 52.47 52.57 51.85 52.40 + .28

Aug 51.80 51.20 86.85 51.05 + .20

Oct 47.45 47.85 47.45 47.80 + .28

Dec 48.55 48.60 48.15 48.45 + .26

Feb 46.60 46.75 46.20 46.27 - .00

Apr 47.50 44.70 44.91 44.90 - .15

Sales: April 1399; June 42.49; July 1662; Aug 973; Oct 211; Dec 285; Feb 48; April 25: June 54.00

Open Interest: April 2816; June 949; July 4870; Aug 2487; Oct 1572; Dec 1528; Feb 398; April 286; June 111.

ShiELL EGGS (22,508 doc)

Apr 45.90 45.95 48.95 48.70 + .18

Jun 47.25 49.95 48.90 48.70 + .18

Jun 47.25 49.95 48.90 58.90 + 1.80

Sales: April 48; May 256; June 81; July 12;

Sales: April 48; May 256; June 81; July 12; COTTON, No. 2 (58,800 Rist)

May 56,40 56,53 56,25 56,52

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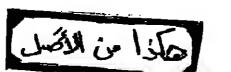
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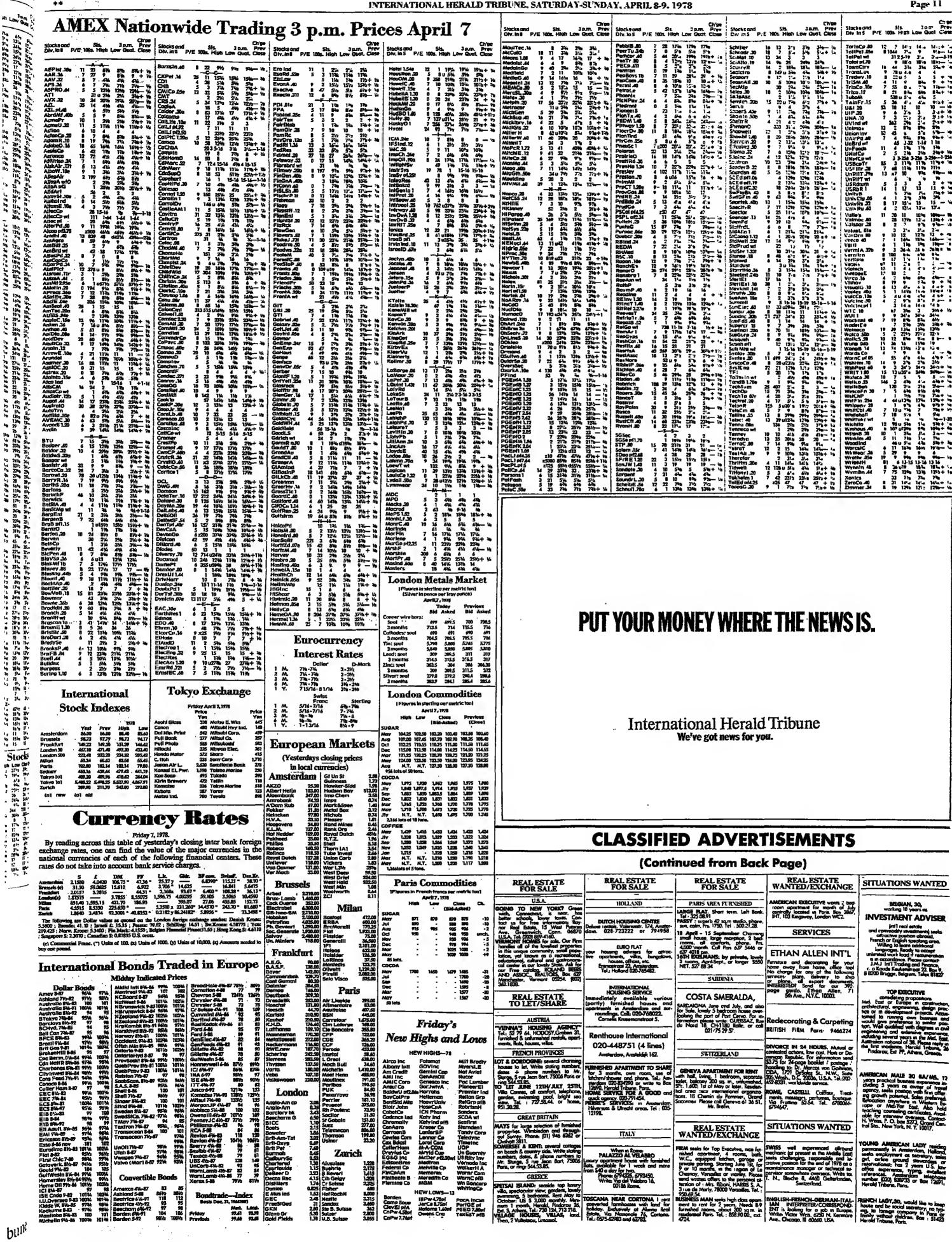
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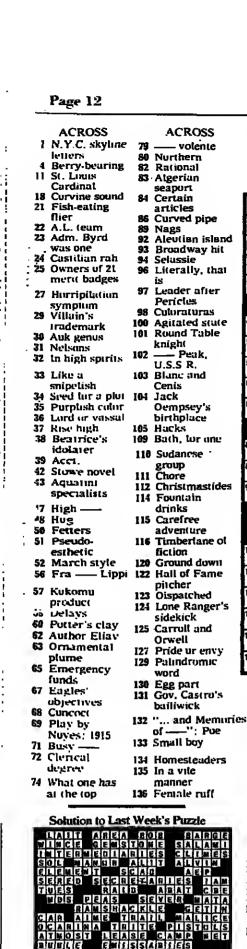
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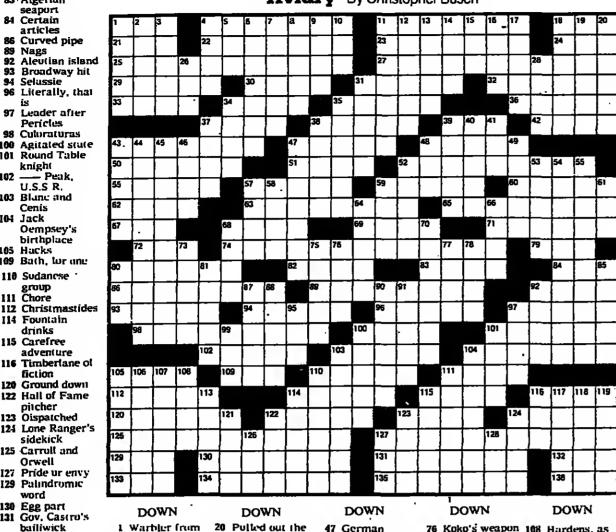
RELATIVES

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CROSSWORD PUZZLE Edited by EUGENE T. MALESKA

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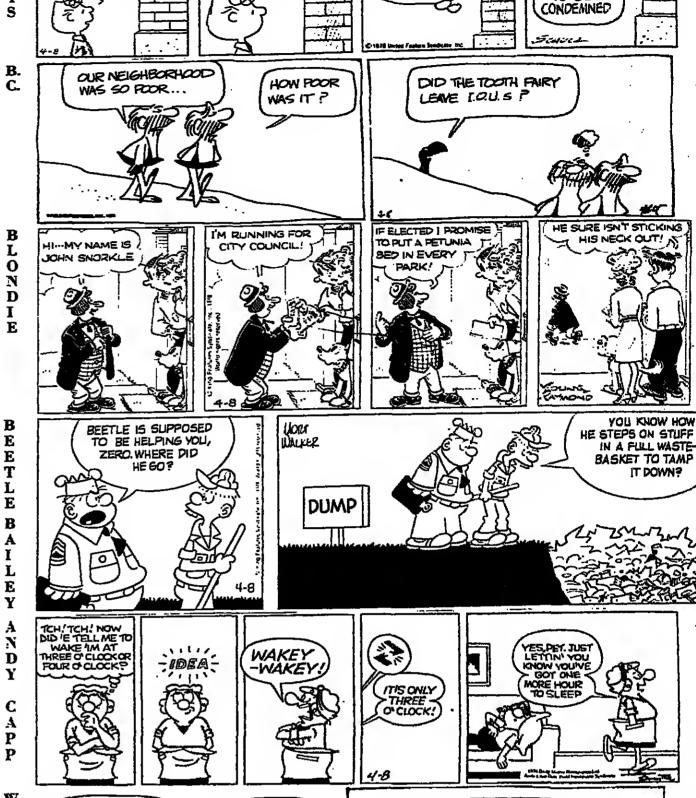
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BOOKS.

THE AMBIVALENCE OF ABORTION By Linda Bird Francke. Random House. 261 pp. \$10.

ABORTION IN AMERICA The Origins and Evolution of National Policy. By James C. Mohr. Oxford. Illustrated. 331 pages. \$12.50. Reviewed by Christopher Lehmann-Haupt THE Supreme Court in all its the experience unscathed. Most of

mere book, or book reviewer, is plenty of room for argument, and plenty of argument indeed has been raging within that room. On the ooe hand, there is a growing belief, particularly among rightto-lifers, that many women have begun to take too casual an attitude toward abortion, that they have come to see it as an easy alternative to contraception. On the other hand, some feminists cannot understand what all the fuss is about. They see abortion as simple and absolutely liberating. is casual about the experience or not is pobody's damn business.

Between these two positions is

wbere Lioda Bird Franke's "The Ambivalence of Abortion" comes in. Miss Francke wants to convey She wants to do it with more evidence than is offered here by ber own abortion experience, which abortion experience. was unahppy ("A very little ghost" kept appearing and waving at her whenever she saw James C. Mohr's " "something beautiful, like the full moon on the ocean last weekend") and which evoked a

So after briefly describing the history. lechniques and current availability of abortion, she devotes the balance of her book to verbatim statements of various people she interviewed. Her subjects include single women who had abortions both after and before the 1973 Supreme Court decision to legalize abortion, both in their first and second trimesters. as well as married women, men. medical fraternity to professionalcouples, teen-agers, parents and "women looking back" to 30, 40

the right-to-lifers our the mure ex- tion of abortion. It is, ironically. treme feminists. If there is any these very same groups that are generalization we can draw from now io favor of abortion, and are the rambling testimonies printed now, in the one case, performing here, it is that whatever the reasons were that these people decid- of it. ed to undergo abortion - and some of them were casual, while most were carefully considered almost no one came away from Times.

wisdom has not been able to the women were hurt, physically. settle the vexing issues surround- even in their first trimesters, ing abortion. Nor have philoso- Many were damaged psychologiphers, from Aristotle all the way cally too, experiencing fear, guilt down to Phyllis Schlafly. So no over their lost children, a subscquent revulsion for sex, lowered going to do it. Still, between abso-lute positions pro and con there is conceive again and a tendency to withdraw from their partners.

If one can trust Miss Francke's evidence. Unfortunately, one cannot entirely believe it. She seems to have an affinity for hearsay evidence. For instance, early in ber book she announces that "in a most disturbing trend, some womeo are having an amniocentesis, which is a test designed to pinpoint possible melabolic and developmental disorders in the fetus done solely to determine the sex of the fetus, and are opting to They think that whether a woman abort it if it is a girl." But bow many "some women" are, or bow the author knows they are doing this, she does not bother to say. Similarly, but far more damaging-ly, there is no evident rationale for her sampling. For all we what the actual experience is like. know, the interviewees were chosen simply to illustrate what Miss Francke berself believes about the

A far more interesting and pertinent study of the subject is James C. Mohr's "Abortion in America: The Origins and Evolution of National Policy." This is a somewhat scholarly but altogethstorm of response when she described it in a New York Times's Op-Ed piece under the byline "Jane Doe."

"Jane Doe."

"Jane Doe."

Storm of response when she described it in a New York Times's citon policy in the 19th-century, by a professor of history at the University of Maryland Baltimore County. There is not space here to describe exactly how Prof. Mohr thinks we got from the completely permissive attitude toward abortion that prevailed in the United States until 1840 to the strict prohibition that had triumphed by 1900.

The point is that uotil 1840, a permissive attitude did prevail. It was in large part the desire of the ize itself and anxiety on the part "women looking back" to 30, 40 of upper-middle-class white and 50 years ago.

The results. if we can trust their declining birthrates that their declining birthrates that contributed to the legal proscriptor of the right to life to not the open and the results. now, in the one case, performing

> Christopher Lehmann-Haupt is a book reviewer for The New York







TO YOU HAVE ANY MONEY, EARNA?

HE SAID THE

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IS FIFTY

FUST WE COLLECTS A MESS O' GUN-POWDER AND SHOT.

JUMBLE THAT SCRAMBLED WORD GAME
by Henri Arnold and Bob Lee Unscramble these four Jumbles, one letter to each square, to form **PYKER ROHAB DACROW** SOUNDS LIKE THE GHOUL'S FAVORITE DRINK. DOLIBY Now arrange the circled letters to torm tha surprise answer, as suggested by the above cartoon.

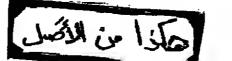
Print answer here:

Jumbles: BOUND EMBER INFORM QUENCH Yesterday's Answer: Ha called her Sugar because he thought she was this — SO "REFINED"



T TOLD HIM YOU COULD TALK HIS EAR OFF. "

17.15



Dallas Yawns at NFL Draft Prospects

DALLAS, April 7 (UPI)—The chance. The mortality rate is National Football League draft is going to be high." less than a month away and it would seem that the big question is why does anybody care?

The fact that good players are in short supply should not come as good news for the Cowboys—

Yes, there is the question of they have the hurden of drafting whether Tampa Bay can unload its No-1 draft pick for some hig offensive linemen. And then there will be a slight hit of guessian. will be a slight hit of suspense as to whether Earl Campbell will be the top selection despite his poor showing in the Cotton Bowl.

But after that it looks like a hunch of vawns.

At least that is the way they figure it in the scouting department of the Dallas Cowboys.

"It is not a good draft," said Cowhoy vice-presideot Gil Brandt. "For some unexplained reason, it's just oot very good at all. When you get past the third round in the draft this year you

There is this always the persistent rumor that Dallas will pull off another spectacular trade this year, acquire Tampa Bay's No. 1 pick and select Campbell to go in the same backfield with Tony Dorsett

But Brandt insists there is 00 chance of that happening and he thinks the trade Dallas made with Seattle to acquire Dorsett last year makes it tough for Tampa Bay to trade with anybody.

"Tampa is trying to trade its first choice," said Brandt. "But I

don't think they will be successful

team has won in its second year— and all those players they got in our trade contributed.

"But what you have is the Tam-pa fan saying, 'Gosh, look what Dallas did with Dorsett.' If they trade the choice, they have to ask for too much to satisfy the fan. It puts more pressure on Tampa to make a better deal. And the more you ask the tougher it is to deal."

Linemen Sought

If Tampa keeps its pick, will it take Campbell?
"You always oeed a player like

Campbell." said Brandt. "But maybe some teams would want to strengthen themselves in another area. Tampa's defense was great, hut their offense was terrible. Maybe they feel they can get two outstanding linemen and maybe a

"I think that trade benefitted both teams. Seattle won five games—more than any expansion "If you can get offensive linemanners like Dan Dierdorf and Coorad Dobler, then a back like Jim Otis can gain 1,000 yards. As for the overall draft, Brandt

is very unimpressed.
"This is not the year for the really good player," Brandt said.
"Usually there are 10 to 15 outstanding players, the type that in three years you know will be Pro Bowl material. I don't see that

"There is oo depth in any posi-tion. For example, you have two pretty good running hacks in Campbell and Terry Miller of Ok-lahoma State. There are a couple of good offensive linemen bot there really are oot any outstanding defensive linemen.

"Last year, 19 linemen were 1972 crop. Eleven of the 26 play-drafted in the first round but I ers taken in the first round that don't think you will see that hap-year are oo longer in propen this time. pen this time.



Earl Campbell

"This year reminds me of the

Former Olympic, NFL Star

Bob Hayes Arrested for Drugs

DALLAS, April 7—A oational yonth athletic program has severed its association with Boh Hayes after the Olympic gold-medallist and former Dallas Cowboys wide receiver was arrested on drug charges.

Hayes, 35, was charged yester-day with delivering cocaine and qualudes to undercover officers.
"Due to this incident, we do not feel that it is appropriate that he continue his association with our national track and field youth program," a spokesman for the Hershey Foods sport program

Hayes was released on \$30,000 bond. He woo two gold medals at the 1964 Tokyo Olympics and his 400-meter relay record still

stands.

The fleet Hayes spent 10 years as a wide receiver for the National Football League's Dallas Cowboys. With 76 touchdowns, he is the leading scorer in Cowboy history. He also remains the team's too all time receiver with team's top all-time receiver with 358 catches for 7,177 yards and punt returner, with 1,147 yards on 102 returns.

Hayes has been involved in the

youth program as a coach and

The Hayes arrest follows a series of drug-related incidents involving current or former athletic

glory, arraigned: "angel dust."

Al. Jones, not so long ago
amoog hoxiog's top 10
heavyweights, awaiting grand jury

action: cocaine, Lem Barney, NFL star, alleged in an affidavit to have been wiretapped by officers in a "pertinent" conversation: cocaine and amphetamines. Darrell Shepard, University of Houston quarter-back whose recruitment last year landed the Cougars on NCAA probation, charged: marijuana.

er, former Miami Dolphin line-men, marking time in Dade County Stockade, Miami, hoping they will be released early for good behavior in time for Reese to join the Toronto Argos and Crowder maybe to hook on somehwere for NFL action this



LONDON, April 7 (UPI)—International sports federations joined the International Olympic Committee today in warning Los Angeles that it would not be awarded the 1984 summer Olympics even though it was the only bidder unless it changed its attitude toward the Games.

Thomas Keller, president of the General Association of International Sports Federations, said that the financial demands made by Los Angeles in its bid for the 1984 Olympics were "unacceptable."

Los Angeles is the only city bidding for the games but already is involved in a wrangle with the IOC about how millions of dollars from television rights should be controlled.

Keller, representing the 26 Olympic sports federations, warned Los Angeles that if its bid was not accepted by the IOC at its session in Athens next month, the bidding could always be reopened and another

"In my opinion the Los Angeles approach is unacceptable," Keller said at the end of the conference of European sports ministers.

"There are many other cities which could handle it and are geared up for it, like Munich and Montreal," Keller said. "If Los Angeles and the IOC don't come to some agreement, then there is no way but to reopen the hids in a year's time." Support from the international federations for the IOC's tough line with Los Angeles was expected because the federations all get a heavy slice of the television money. They could lose much of this money if the city controlled the television revenue, using it to finance the games themselves.

Although the members of the IOC will decide the fate of the Los Angeles bid, all 26 federations will have representatives at next month's session, and without their approval the IOC would be unable to stage the games.

Keller will accompany Lord Killanin, the IOC president, when he and he got down in two putts.

Six feet and made that putt for his flies to Mexico City this the weekend to meet the Los Angeles deleOn the par-4 14th, a pitching fourth straight birdie. Then he gates in a bid to find a compromise solution before the formal bid is placed before the full IOC session May 17.

Television rights for the 1980 Moscow Olympics will top \$100 million for the first time with NBC already having paid \$85 million for

LOS ANGELES, April 7 (UPI)-With Los Angeles and the IOC

The council voted 11-1 to place on the November ballot an Olympic

It would forbid the city from spending any municipal funds or using the city's credit in any way to help stage the games, except for loans guaranteed by the organizers' contracts—such as sale of television rights—plus \$5 million in "seed money" if covered by future income

from taxes on the games. The measure does not offer voters a chance to vote against hosting the games at all—which some wanted—nor to ban all city spending on



Schlee Takes 1-Shot Lead In First Round of Masters

By John S. Radosta

AUGUSTA, Ga. April 7 practice shot in recent weeks, turned fantasy into reality yester-

Schlee, who quit the PGA tour for a club job last seasoo after a series of injuries, carded a four-under-par 68 and took a one-shot lead in the opening round of the 42d Masters tournament, Joe Inman, the last player on the Augusta National Golf Club course, had a share of the lead until he bogeyed the 17th hole. He wound up with a 69.

But the day belonged to Schlee, who has a fixation about yardages he can trust. One day in last year's Masters be was so annoyed at having chosen wrong clubs n the par-3 12th hole that he borrowed some gallery rope and mea-sured the distance from tee to green for himself.

It turned out to be 155 yards, exactly what the scorecard and his caddie had said, but now be was reassured because this was his own measurement, and it called for a 7-iron.

Yesterday, the 39-year-old pro from Texas hit the 7-iron on that hole 12 feet from the pin and sank the putt. That deuce was the first of four consecutive hirdies that propelled him to his 68.

Crowd at 72 ters to round out his collection of

NEW YORK, April 7 (AP)-

Fresb new faces appear on several

major league rosters as the haseball seasoo opens.

Perhaps the team depending

most on its rookies is the Detroit

Tigers, who move into the Ameri-

can League season with a new

double-play combination com-

posed of rookies, second haseman

Lou Whitaker and shortstop Alan

Trammell. Both move to the ma-

jors following impressive minor

league seasons at Montgomery. Trammell batted .291 and Whi-

taker .280 there. The Tigers have

so much confidence in the pair

that they traded Tito Fuentes and

Tom Veryzer, their second base-

shortstop combination in 1977, to

California made a similiar

move, trading an established star outfielder, Bohby Boods, to make

room for rookie Ken Landreaux,

the minor league player of the year last season. Landreaux bat-ted .357 with 27 bome runs, 116

runs batted in and 20 stolen hases

with Angel farm clubs at El Paso

Infielder Ted Cox, who can play third base or first hase, was

the key man for Cleveland in a

and Salt Lake City.

make room for the newcomers. **Bonds Moves On**

year pro.

Tom Kite, Jerry McGee and (NYT)—John Schlee, who imagined be was playing this or that ahead of a huge crowd massed at that bave slowed him down. First bole in the Masters with every 72. This group included Jack there was surgery for a ruptured 72. This group included Jack there was surgery for a ruptured Nicklaus, the only man to win the disc in his back in January, 1976. Masters five times: Gary Player, a Next was a knee operation that two-time Masters champion; Totn
Weiskopf, who has tied for section of four times; Jerry Pate and constantly pained him, and he left
Hubert Green, United States the tour. Only recently did Mike 1977, respectively.

Among those tied with Watsoo

by Dave Eichelberger, who has two sbots and scored birdies, won two tour events in his 12 Those holes were Nos. 2, 13 and years as a pro. Eichelberger was 15. He reached the green of the one under par after seven boles. A 565-yard second with a 4-iron series of disasters left him at eight threaded through the trees, and over par after 14 holes. He fin- be got down in two putts. ished the day at 79. Johnny Mil-

Looks to the Stars

a tie with Bill Kratzert, a third-by that amused his colleagues—he did their boroscopes.

Schlee is strong and wiry, but Open champions of 1976 and Morley, a fellow pro, teach Schlee how to time his release after im-Tom Watson, the defender, pact to avoid aggravating the

injury.
Schlee is now golf director of at 73 were three other former the Rancho Viejo Country Club winners—Arnold Palmer (four near Brownsville, Tex., and he times), Gay Brewer and Tommy says that he enjoys teaching. He Aaron. Others at 73 included would like to go back to the tour Hale Irwin, the 1974 United hut—the tour is fun when you're States Open champion, Lee Elder playing well and you don't hurt."

A key to Schlee's round was the One of the most awkward fact that he reached the greens on rounds of the day was turned in three of the four par-5 holes in

Schlee carded a birdie on the ler, who was quite sharp bere un-til two years ago, shot 77. fifth, a par-4 bole of 450 yards, by hitting a 6-iron to three feet. He hitting a 6-iron to three feet. He followed that with bogeys on the seventh, where he was bunkered, John Schlee is 6 feet 3 inches and the 11th, where be hit his sec-

Then he came to the 12th hole and because it is in a hollow

bunker to the green. On the next

pin and he sank the putt for bird-

ic. On the par-5 15th, a 4-wood sailed over the pond to the back of the green. He chipped down to

Transactions

SEATTLE MARINERS—Signed Bill Plummer, curcher, to a contract with Son Jose of the Pucific Coast League.
TORONTO BLUE JAYS—Signed Michael Lebe, caricher, and assigned him to Dunedin of the Florida State League.
National League. Reds received pitcher Vida Blue

and sent Revering and \$1.75 millioo to the A's. When that deal fell through, Oakland traded pitcher Doug Bair to Cincinnati PHILADELPHIA PHILLIES—Released Terry Harman, Infielder: Optioned Dan War-then, pitcher, outright to Oklahama City of the American Association.

ST.LOUIS BLUES—Sent Ken Richardson forward, to Salt Lake City of the Central Hockey League.

Thursday's Line Scores

Washington, who stole 39 bases and hit .255 at Omaha last year,

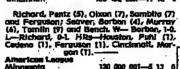
Seattle Loses to Twins

SEATTLE, April 7 (AP)-Righthander Roger Erickson, making his first big league appearance, limited Seattle to 5 singles in 6 innings and Roy Smalley and Willie Norwood each drove in

Mariners last night.
The 21-year-old Erickson, a nonroster player in the Twins'

iners in the major league opener on Wednesday night.

CINCINNATI, April 7 (AP)-Joe Morgan drove in five runs and keyed a five-run lifth-inning rally with a two-run double as the Cincinnati Reds beat the Houston Astros, 11-9, in the National



NBA Results

Washington 172, Başton 103 New York 129, Defroit 125, Clevelond 117, Milwoukee 105 Son Antonio 123, Konsos City 116 Denver 111, Phoenix 105 Golden State 112, Partiond 16

Detroit 6. Pittsburgh 4 Buffolo 5. Boston 2 Philadelphia 3. New York Rangers 0

NHL Results

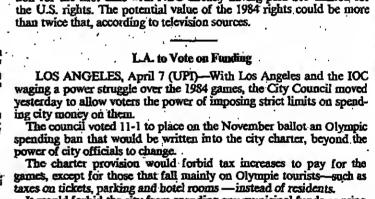
WHA Result

Valdes Training

SAN REMO, Italy, April 7 (AP)—The world middleweight hoxiog champioo, Rodrigo Valdes, has started training in this Italian Riviera resort for his April 22 title defense here against Hugo Corro. Corro is due in San Remo next week.

Home Run Record

TOKYO, April 7 (AP)-Adrian Garrett, a former major league outfielder, set a Japanese record this week by hitting home runs in each of the season's first four





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John Schlee follows through on 14th tee in first round of Masters.

ing at the edges, and very long teeth. He was the PGA Tour rookie of the year in 1966 and he

tall, has brown hair that is gray- ond shot over the green,

made the top-60 money list six in what is called the Amen Cor-years. His best year was 1973, ner. The 12th, one of the most dif-Crowd at 72 when be was runner-up in the ficult par 3's in U.S. golf, is tricky game.

Lee Trevino, who needs a Masurate of the fairway, like a like a like of the fairway, like a like of the fairway, like a like a like of the fairway, like a like of the fairway like a like of the fairway

where the wind swirls constantly. hole, a par 5 of 485 yards also Club selection is often a guessing menaced by the's creek, Schlee

major championships, shot 70 for and \$118.017. He also had a hob- watch hand pointing at 2 o'clock, protecting creek and the front wedge put him 12 feet from the parred his way in.

for Revering.

got home with a 6-iron to 35 feet.

Many Teams Are Counting on Young, Fresh Blood

batted .328 last season at Omaha.

camp this spring, was relieved by Tom Johnsoo in the seventh inning. He wild-pitched bome a run in Seattle's two-run rally, then gave up a home run to Ruppert Jones in the ninth before nailing

League opener yesterday.



six-player trade that sent pitcher homers and \$1 RBIs with the Red games when the Red Sox called batting 300 with 29 homers and 110 RBIs for the Reds' Indianapwas the most valuable player in a major league record for rookies Oakland is depending on rookolis farm club. Revering was actuthe International League last sea-son when he batted .334 with 14 league at-bats and hit .362 in I3 acquired from Cincinnati after Commissioner Bowie Guthrie Gets \$100,000 to Attempt Indy

Guthrie's participation in what

amounts to an all-male sport cre-

The second secon

Cincinnati shortstop Dave Concepcion takes the throw from catcher Johnny Bench at home as

Houston's Enos Cabel steals slides safely into second base vesterday on steal.

NEW YORK, April 7 (NYT)— field last year in an outdated car Indy-car ranks in 1976. However, A week ago, Janet Guthrie said owned by Rolla Vollstedt. She the fears of veteran drivers that on national television that oo one started 26th in the field of 33 and, she would be "unsafe" have not wanted to sponsor a 40-year-old because of engine problems, woman driver for the Indianapolis 500 this year.

because of engine problems, parked after 27 laps, and finished 29th. lis 500 this year.

"What a difference a week

Yesterday, as she announced that she would receive "somewhat more than \$100,000" in oil money to attempt to take part in the milmore than \$100,000" in oil money to attempt to take part in the mil-lion-dollar race on May 28, a rep-"She deserves better equipment than she has had," said Shirley resentative of George Harrison, the former Beatle, called to say he, too, would kike to sponsor the Murphy, a 79-year-old husiness-man who was owner of the 1964 only woman in history to appear and 1967 Indy winners—prepared by Bignotti and driven by A. J. Foyt. in the auto racing classic. The representative was told that Harrison

materialized. Guthrie, in two seasons, has been safe. She also has been slow, failing to finish in the top 10 of any United States Auto Cluh race.

"Of course, we've oo way of really knowing how good, or how had she is." said one auto racing figure. "She really hasn't had good equipment. And she carries the hurden of the women's movement on her shoulders. She doesn't take risks because tons of publicity would come down on her if she ever had an accident. And if you don't drive aggressive-ly, you don't win. I don't think makes," said Guthrie.

Guthrie, who failed to qualify for the 1976 Iody 500, made the amateur racer hroke into the Indy." there's any chance she can win at

Atlanta is high on catcher-first baseman Dale Murpby, who bat-ted .305 in 105 games at Richmond with 22 home runs and 90 RBIs last year. Murphy hit .316 in . an 1g-game trial with the Braves

No team has a more exciting

High Hopes in Atlanta

rookie class than the defending American League West champions the Kansas City Royals:-out-fielder-first baseman Clint Hur-dle, infielder U.L. Washington and outfielder Willie Wilson. Hurdle, who won the veteran John Mayberry's job this week,

games and Wilson, who batted .281 and stole 74 bases at Omaha, hit .259 in training camp.

batted .375 during exhibition

two runs to lead the Minnesota Twins to a 5-4 victory over the

down the game. The Twins lost, 3-2, to the Mar-

Reds Beat Astros

Art Buchwald

Back to Bartering

sick, sagging, sinking or collaps-

ing under its own weight.
It wasn't always like that. For years after World War II, the dol-

lar commanded respect in every part of the globe. It was the golden age for Americans and we were sought after, flattered, admired and seduced by people dealing in less vaunted cur-

rencies. None of

us ever dreamed that some day the dollar would be treated in Europe and Japan as a terminal

What went wrong? I discussed this the other day with Alain, a French friend, who believes the

He told me, "It wasn't the dollar we were so interested in at that time as American cigarettes, nylon stockings and Hersbey stay away from the low-tar cigabars. If you recall, back then the Europeans were much more interested in bartering for those items than they were in acquiring mon-ey. We were perfectly willing to continue taking your cigarettes, nylons and Hershev bars in exchange for lodging, food and favors. But your government forced the dollar on all of us, and we took in so many of them over the years that we finally said, 'Enough is enough'."

"Are you trying to say that if the Americans had stuck to cigarettes, nylons and Hershey bars the dollar wouldn't be in trouble

today?"
"Of course. Europeans have an insatiable appenite for cigarettes, nylons and Hershey bars. But when you've seen one dollar you've seen them all.

WASHINGTON—I've been giving a lot of thought to the dollar lately. Depending on what paper you read, the dollar is was to flood our countries with dollars. What you forgot is that

uon increased."

faith in chocolate than we have had in our money."
"Yet, Alain, there is a flaw in your argument. The Europeans started to make their own ciga-rettes, nylons and candy bars af-ter the war. We would have had to devalue ours as your produc-

Europeans have always had more

"We only went into the cigarette, nylon and chocolate bar business after our sources of these goodies dried up. In Germany, France and Italy you discouraged your GIs from using cigarettes as currency. You told them if they waved nylons or Hershey bars under our noses they would be considered ugly Americans. But we never thought that way. A carton loss of confidence in the dollar started sbortly after the war ended.

of cigarettes, or a pair of stockings, or a Hershey bar with almonds in it is something a person

never forgets."
"Would you advise the United States to get off the dollar kick and go back to trading in those particular i tems again?

"It couldn't hurt. But I would rettes because Europeans like their tobacco strong. And you might substitute pantyhose for

nylon stockings."
"What about Hershey bars?" "I wouldn't mess with them. Don't forget, we're very strong on

tradition. "It could be the solution," I told Alain. "God knows, it worked for us after the war. We've been so blinded by our economists that we've forgotten the things that really count with people. Perhaps if American tourists filled up their suitcases with pantybose and chocolate, the dollar would be king again."

Alain said, "It's a little late, but it's worth a try. The gnomes of Switzerland might scream, but I don't know one Frenchman wbo would not rather have a pound of "We were willing to go on for-ever giving you anything you gold."

MARY BLUME-

The Muppeteers Are the First to Laugh

L ONDON (IHT)—The off-ice TV monitors at Elstree Studios are tuned to the shooting, a floor below, of "At the Dance," a regular feature of "The Muppet Show" in which farmyard animals foxtroi lightly in a pulais de danse decor and exchange old-time vaudeville parter.

"Ah hate barn dances. Ah only come for the door prize."
"What's the door prize?" "A ticket to the next barn

Through countless retakes the people in the offices chuckle. Nowbere else in television do you see chuckling producers

"It's a joy to do the show, the end product is so pure. says the producer, David Lazer, who has worked with Muppet inventor Jim Henson since the days when a Muppet named Rowlf starred in coffeebreak films for IBM sales meet-

The whole show is designed to amuse the people who do it," says Jerry Juhl, a writer who has been with Henson Associates (or HA!) since 1961 and worked with Henson on the ground-breaking "Sesame

"A French reporter wanted a deep analysis of our comedy. I'm afraid we put her on a bit. We said it had a lot to do with anarchy.*

Despite Henson's triumphs on "Sesame Street," which be still commutes across the Atlantic to do, every American network turned down The Muppet Show" on the grounds that adults wouldn't watch it. Britain's ebullient Lord Grade, who has backed everything from Englebert Humperdink to Jesus of Nazareth, took it on. It is seen each week by 210 million people in 103 countries.

The Muppets are mostly made of foam and cloth and worn on the puppeteer's upraised right arm, which causes a lot of back trouble. The most brilliant puppeteer is Frank Oz—"the person most responsible for the Muppets being funny," says Jim Hen-son—a bald, mustached rather

UPON INSTRUCTIONS FROM THE PRINCIPALS OF SWANCLEAN SERVICES

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Jim Henson with Kermit.

remote figure who plays Fozzie Bear, Animal, Sam Eagle and, above all, Miss Piggy.

"Frank took Miss Piggy and made her into a superstar," says David Lazer. Miss Piggy is a ravishing liberated blonde with a fearful karate coop. She is in so many scenes these days that she has to be remade in the workshop once a year, which is traumatic as they always come out a little different. "Last year she put on a little weight," says the worksbop

The show's loose framework involves a group of Muppets trying to put on a show, abetted by a human guest star and heckled by two ill-tempered old-man Muppets named Statler and Waldorf. Kermit the Frog. a 22-year-old Muppet who also appears on "Sesame Street" and is played by Jim Henson, is the harassed direc-tor and M.C. Besides Fozzie Bear, a spectacularly insecure comic ("Frank wants him to have group therapy," says Jerry Juhl), there is the manic Great Gonzo, some super-cool pit

"We've been thinking of adding a whole new area backstage-a canteen with a waitress giving out bad food and

musicians, and a cast of doz-

cold coffee. She's very surly and aimiable," says Jerry Juhl. Each week there is a live guest star-Bob Hope, Julie Andrews. Lena Horne, Liberace, Rudolf Nurevey, who danced "Swine Lake" with Miss Piggy. Many stars worry about being upstaged by the

Muppets. "Some of them say no one will look at me," David Lazer says. "Somehow, it's Jim Henson's genius, they are showcased—we bring out a new dimension."

Henson may be television's only genius: The only one to bring something original to a medium based on forms filched from radio, variety and films. "I love television-all the

things you can do with it as a form," he says. The Muppets were invented for TV and he uses them to shrink or stretch the screen, playing with pro-portion so that the Muppets appear to be one size with each other, another with guest stars, but always keep their physical integrity. The effect is of an entirely coherent world ruled by some private logic, where everything has its place.

Henson is tall and lean with deep-set eyes and the look of the leader of a commune, which in a sense be is. When he

waits on the sidelines wearing Kermit (be also plays Rowli, Mr. Walford, Mahnamahna, Dr. Teeth and Capt. Link Hogthrob), he is like Frank Oz, off in another world. When be is in the workroom, chatting in front of boxes labeled assorted arm wires, plain arm wires, newfangled arm wires, he is serious, communicative, ana-

"We're always trying to develop new things, new characters, he says. One is Fleet Scribbler, the gossip columnist. "We talked a lot about Fleet Scribbler, we used him a lot. We couldn't get a handle on his character. Now he's hanging on

The Muppeteers believe in their characters, though they don't like to talk about it. "We have arguments about whether a character would do that. We believe them when we're watching the monitor."

Jerry Juhl denies that the puppeteers believe their characters exist, then adds, "Well, Frank may invite some of his characters to lunch once and a

"There are certain ones I love to do," says Jim Henson. Link is so much fun. It undoubtedly bas to do with the pompous side of myself. Also, Link is incredibly stupid, which is fun. He won't tell Pig-gy his real name, which is Mortimer. But every time she calls him Mort, he answers."

As a writer, Jerry Juhl re-fuses to talk about his invocite characters: "If I indicated a preference, I would have five puppeteers come up and rip off my kneecaps."

The monitors go on. Down-stairs, in the workshop, one of Henson's five children is learning how to make repairs. On stage, Henson is holding Kermit and sitting very still. He has put on a beaded headband. The monitor squawks:

"You know my husband weighs five tons." "That sounds like a lot of bull.'

"It is, darling, it is."

PEOPLE: To Renounce LLewellyn The Princess Reported

Princess Margaret, whose style of living has aroused a national furor, will probably abandon her relationship with young socialite Roddy Liewellyn in order to continue her public life, it has been reported. British Press Association correspondent Granla Forbes, who has close contact with the royal family, reported that the 47-year-old sister of Queen Elizabeth has decided not to withdraw from public life and will resume public engagements as soon as she gets over a bout of the flu. Princess Margaret, making her first public appearance since coming down with the flu earlier this week, attended a state banquet Thursday night for UN Secretary-General Kurt Waldheim. Prime Minister James Callaghan and his wife were among the guests. Shortly before the banquet, Callaghan and Queen Elizabeth held their regular weekly meeting at Windsor Castle, just outside London. Politcal sources in London speculated that Cal-laghan intended to broach the subject of the adverse publicity stirred up by Princess Margaret's friendship with the 30-year-old Liewellyn. The content of the talk was not made public. A national opinion poll has reported that 73 per cent of the those queried think that the princess's life style is harming ber standing as a princess and 57 per cent believe that she should make a choice between her royal duties and her friendship with Llewellyn. Miss Forbes said that the princess has decided not to withdraw from public life, as some of her critics have suggested. Her report quoted close friends of Margaret and Llewellyn as saying the decision means the princess will turn her back on the brewery heir and aspiring pop singer — at least publicly. Llewellyn's record producer, Tony Eyers, said Llewellyn was resting at his home in London. "Roddy is very distressed by the whole business," Eyers told reporters. "It's getting him down." Miss Forbes is the only British reporter allowed to cover Buckingham Palace on a daily ba-

disclose but not officially

A second obscenity trial of Hustler magazine owner Larry Flynt has been continued indefinitely in Ohio's Hamilton County Common Pleas Court. Judge Robert Kraft took the action after Flynt's attorney, Andrew Dennison, explained that an appeal is still pending and Flynt is paralyzed from last month's sbooting in Atlanta. Flynt was convicted by a Hamilton County Common Pleas Court jury in February, 1977, on charges of pandering obscenity and engaging in organized crime.

A misdemeanor marijuana charge against comedienne Judy Carne has been dismissed because n prosecution witness was on vacation and unable to testify against her. Los Angeles Municipal Court Judge George Zucker refused a request to delay the marijuana possession trial because of the deputy's absence. The charge was a misdemeanor, so it cannot he refiled, according to prosecutors.

A woman assumes her busband's surname as a matter of tradition "and little else" and is not required to do so, Maine's attorney general has ruled. In fact, Joseph Brennan said, a man has the right to take his wife's last name and both have the option of retaining their own names after marriage. "If a woman has the option of assuming her husband's name or retaining her own name, then the husband also must have the same option as to whether or not to assume his wife's surname," Brennan told Bureau of Vital Records Supervisor Marion Perkins. "The normal practice of the wife's assuming the husband's surname upon marriage is a matter of tradition and little else." Brennan ordered the bureau and town clerks to accept marriage certificate applications indicating the man would assume the wife's surname, the woman would take the man's last name or both were retaining their own sis and is frequently a conduit for news the royal family wishes to surnames.

-SAMUEL JUSTICE.

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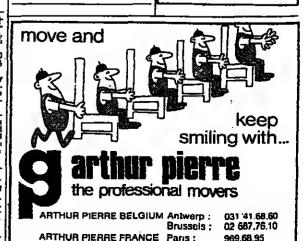
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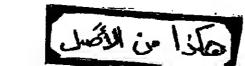
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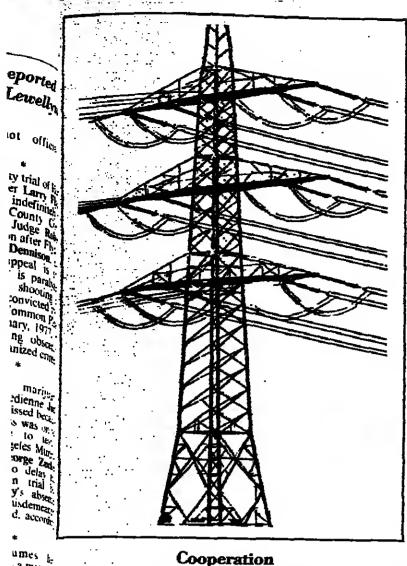


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Cooperation

Consumer Countries Pool Their Research Efforts ames ale DARIS (IHT)—One of the more ried out at the community's rean has a positive consequences of the search establishment at Ispra. This husban, oil crisis has been the growth of in-

own tag ternational collaboration in energy year. Another project that will cost must be research and development. If conmust be research and development. If conwhether, sumer countries have not always project, which is to be carried out
is will seen eye to eye on the political
ald Blue issues, they have all recognized the
commission proposals are
visor Mg efforts. Centers of this collaboraall praction are the European Economic
ming in Community in Brussels and the Inspent on alternative energies may pon az ternational Energy Agency, which dition a is situated within the buildings of

· a mailer.

te opuog.

sion that initiates projects, gets out seismics or exploration drillithem approved by the Council of in certain areas within the EEC.

Ministers and then administers
Thanks to the community's we them. The funds come from the on nuclear safety at Isoar, world community budget and council approval must be unanimous. Invariabout the risks of conventional nu-

energy specialists. With money to spend and contracts to negotiate, it has contacts at both government and industrial levels.

its bureaucracy. It may take proposals due to be put before the months of consultations with spemonths of consultations with spenial is cialists before the Commission staff prepares its proposals and the Commission has adopted them. There may be further delays while the proposals are being examined and eventually approved by the More months will pass while the Commission vets applicants for its will grants and formalizes contracts. Every EEC country wants to have Markel its fair share of the cake and politipride technical ones.

More Flexible

The IEA system is much more flexible. Ideas for projects are developed within special working participants putting in more than ties composed of government representations. sentatives. Each working party deotes itself to a specific energy area and its members meet on a regular

If interest is shown in an idea, ---- the government, or companies designated by the government, will ne-cotinte a deal in which only those TATE countries interested need partici-

Financing is provided by the parde coordinating one and this is reflected by the small number of staff involved in organizing the R and D

The IEA system limits projects its ind their financing to those coun-ries that are really interested in hem. The growing cost of R and D an be shared between countries without the frictions that often ocar in cooperative projects. Howevr, the IEA's program is not on the same scale as the EEC's and there s no attempt at a supranational

Whereas the EEC is a totally Eu-opean body, the agency includes ill the major Western countries, exill the major Western countries, exmodern society had been waiting in
the pre France, and is heavily influmeed by its founding member, the
imelight. With the quintupling of
Jnited States. With eight of the
oil prices, surely its time had come. une members of the Common Yet five years later it is still not Market in the IEA, there are no clear whether nuclear power is ecrets between the two organizaions. The EEC participates in vari- gy future. First, objections were aus IEA projects as a participant in is own right—namely in three cost, now over proliferation and resources put together," says Dr. waste disposal problems. Whereas ion, and solar heating and cooling in 1975 the Organization for Eco-

EEC Budget

Within the EEC responsibilities are divided among different departnents, and no official total for en-argy R and D expenditure is available. But it is reckoned that some 5200 million are spent each yearsome 60 percent of the whole com-

The community's first response dition at is situated within the buildings of deted the Organization for Economic Control operation and Development in Pariplicance around \$200 million each year in ld assume around \$200 million each year in energy R and D, while the IEA is far, the Commission has put up backing some 30 projects worth last name about the same amount.

The manner in which the two organizations is sector. This year the last name about the same amount.

The manner in which the two organizations operate is very difference.

USTICE ent. In Brussels it is the Commission is also hoping to offer grants to oil companies carrying out seismics or exploration dolling in control in the companies.

Thanks to the community's work ably there is a certain amount of clear plants. The Commission is horsetrading. horsetrading also encouraging the development.
To run such a large program, the of fast breeders and high-temperaCommission needs a large staff of ture reactors.

Projects

Research in coal and alternative energies has so far stood at little The great weakness of the EEC is more than \$15 million each, but could result in a further \$50 million being made available for R and D in geothermal, coal gasification and liquefaction, energy savings and so-lar power. As of now, the major work in new energies included a project in solar power with the decision to build a power plant in Sicily, a joint hydrogen project with the IEA and a geothermal under-taking with a new drilling technique being developed in West

Germany.

The signing in Tokyo this month of two new cooperation agreements concerning wave power and biomass has brought the number of

(Continued on Page 9)

Published with The New York Times and The Washington Post

PARIS, APRIL, 1978

ENERGY TECHNOLOGY

Development Programs Pursued Worldwide

By Michael Parrott

PARIS (IHT)—When the oil crisis broke out five years ago, the first reaction of the Western countries was to call the bluff of the oil producers. Characteristic of the time were the optimistic energy assessments of the Hudson Institute, the confident tone of President Nixon's Project Independence and the statements of U.S. Treasury Secretary Wilism Simon. The idea of the consumer countries was to bring down world oil prices through a crash program of indigenous energy development.

A glance in "Energy Prospects to 1985" published by the Organization for Economic Cooperation and Development in 1975 shows how confi-

dent its members were that they could turn the tables on the oil producers. The quintupling of oil prices alone was expected to reduce the dependence of OECD countries on energy imports in 1985 to 21 percent compared to 36 percent in 1972. With special government efforts to boost oil and gas production, OECD countries could virtually become self-sufficient, the

The same optimism was expressed in another OECD report called "Energy R and D" published later in the same year. "For oil prices of between \$4 and \$6 or even \$7 per barrel (in 1973 terms), technology could open up new oil and other fossil-fuel sources which are big enough to greatly modify the entire energy situation and which were financially and technologically out of range before 1973," it claimed.

Five Years Later

Yet five years after the oil crisis, the United States is still unable to push through an energy policy; and the International Energy Agency, set up especially to coordinate the policies of the consumer countries, is predicting that the OECD countries will produce less energy in 1985 than had been anticipated on the basis of pre-crisis prices. Governments are hesitating to make the enormous investments required and energy producers

argue that the oil price is still not high enough to justify investments in

ew energy sources. In its "Energy R and D" report, the OECD claimed oil from Alaska and the North Sea would be available in 1980 at \$1.25 to \$1.50 a barrel, oil found in waters 300 to 400 meters deep at \$4 and deep-sea oil for \$5 to S8 (all in 1973 terms). Additional costs for secondary and tertiary recovery would be 25 cents to \$1.50. Among the more unconventional oil sources, tar sands were expected to yield oil at \$4 a barrel, shale oil between \$3

and \$7, low-grade coal gas could be produced for \$3 to \$4, solvent refuned coal at \$5 to \$7 and high-grade synthetic natural gas (\$NG) at \$5.

Now the oil companies claim oil from the North Sea and Alaska costs between \$5 and \$8 and that deeper fields may cost \$12 or more. The manufacture of low-grade coal gas is reckoned to be uneconomic below the \$12 range, of tar sands below \$17 or so, of SNG below \$23, shale and the new energies \$25 or more. Yet from all sides come wartungs of an energy crunch in 1990.

The OECD's cost figures in 1973 terms would have to be increased by almost half if they were to be translated into today's dollars. Even so, the differential with current price estimates needs explaining, especially as the "Energy R and D" report benefited from the advice of 13 eminent energy experts and was approved by all 24 OECD members.

For a Ride

Amid all these claims and counterclaims, the public is beginning to wonder whether it is not being taken for a ride. Is this a real crisis or is it just a phony war? Is the development of these new sources really too expensive or are the energy companies just too greedy for profits? Can technology come up with new energies or must we reconcile ourselves to a

deteriorating energy situation?

To some extent the escalation of development costs was predictable. As the OECD report said at the time, "The simultaneous demand of many companies for the same resources might lead to unexpected bottlenecks delays and higher construction costs." But who would have imagined the increases in the construction costs of offshore platforms, nuclear power stations and pipelines?

What nobody expected was the suange combination of high inflation and negative growth that characterized Western economies just after the oil crisis. Governments with budget deficits and unemployment problems thought twice about linancing major energy projects or increasing energy prices. Tighter credit controls drove up borrowing costs and tighter liqui-dity made it increasingly difficult for companies to cover investments. The slowing down of electricity demand affected expansion plans by attitues And investment costs were increased by environmental objections, planning procedures and delivery delays.

Returns

Also holding up energy development is the reluctance of companies to accept a normal rate of return on what they consider to be a risk; investment, According to M.L. Scharrah, R and D director for the U.S. contpuny Conoco (Continental Oil Co.), a major factor in the the recent increase in costs has been the insistence of energy investors on obtaining a 15percent return on their capital instead of the normal 8 percent. With depreciation and financing costs representing as much as 60 to 70 percent of a project, this can push us costs up from \$15 a harrel to \$25.

An added uncertainty is the recent easing of the international oil price in real terms. Due to the slower growth of oil consumption, the arrival of oil from Alaska and the North Sea and the depreciation of the dollar itself, this price decline makes development projects even less attractive. Already unhappy about the viability of some of their fields, the oil companies are hardly going to push prices down further by opening up new

If the consumer countries have done much less in energy development than originally expected, they have not been completely idle. In one country after another, special energy programs have been drawn up, new energy institutions established and research intensified. Significantly, only five years after the oil crisis, the energy research and development programs of the European Economic Community, the IEA and individual governments are really getting underway.

During the last five years, the oil industry has learned how to tackle the rough conditions of the North Sea and Alaska and develop its capabilities in deeper waters. The gas industry is mastering the technology of liquid natural gas (LNG) plants, tankers and sub-sea pipelines. The nuclear industry has come of age with its large-scale production of conventional reactors and new life has come to the coal industry.

If most alternative energies remain uneconomical at present prices, the use of waste heat from power stations is winning increasing support, coal gasification is on the verge of becoming commercial and solar power is proving more promising than was once thought. As the market prices of energy rise, attitudes towards energy are changing and consumption hab-

its are quietly altering within the home and industry.

Most important of all, this period has given governments the opportunity to weigh the policy options open to them. Instead of rushing into crash programs that might have produced energy that was not needed, at financial and environmental costs that might have been regretted, countries have had time to eboose the sort of sacrifices they are prepared to make, the energies they want to develop and the technologies that are most

Amory Lovins of the Friends of the Earth movement argues that a choice must be made between conventional centralized energy development based on the development of coal, oil, gas and nuclear energy, and a non-nuclear decentralized path based on soft energies and what he calls technical fixes. The one policy is geared to multibillion dollar investments carried out by giant corporations, the other to a more careful analysis of energy demand and its satisfaction by a whole range of smaller companies offering their services in different energy areas. Just as the economy itself is made up of large units and small family firms, it should be possible to include both approaches in a national policy.



Tugboats tow the world's largest concrete oil platform to the North Sea.

Breakthrough Still Awaited for Tapping Old and New Sources

DARIS (IHT)—Necessity is the mother of invention, the companies seem no nearer to the companies seem no nearer to the companies seem no nearer to the companies are beginning to be proceed to make the energy crisis, it is difficult to than they were five years ago. They maior breakthrough have made impressive advances in the large way. Under environmentalist have made impressive advances in the large way. pinpoint any major breakthrough have made impressive advances in in energy technology. If there has been a Newton or an Einstein, he these have been nothing more than has not been noticed.

fore the oil crisis are now almost the down-to-sea problems of the ready to be commercialized. Indications are that all the energy companies are waiting for is n further increase in oil prices.

But technologies which were before the crisis, but there has been merely at the laboratory stage beno shortage of ideas in coping with

In the nuclear field, too, it has

pressures, they are being forced to insure greater safety standards than would ever be met in traditional industries. As opposition to nuclear

In the hydrocarbon field, oil rather than innovation. As muclear duction in the United States has intensified research into the technology of gas liquefaction and coal gasi-fication. Although much of the progress has so far been made in the techniques of gas liquefaction and transportation, second-genera-tion gasification techniques being industries. As opposition to nuclear programs grow, research has concentrated increasingly on the problems of proliferation and waste strong in this field, although Britain's interest has become largely academic since the arrival of North

coal liquefaction may be interesting, but for other countries, there are still many cheaper ways of producing oil.

People are still waiting for the comeback of the coal industry. The development of U.S. production has been hampered by environmentalist problems and a slackening demand for the utilities; production in Europe has been slowed by

For a country like South Africa, less polluting fluidized bed com-oal liquefaction may be interest-bustion technique.

Among the newer energy sources, there have been few technological developments in geothermal power, ocean thermal gradients, ocean currents or biomass. Wind and wave technologies are beginning to attract serious support from some governments.

increased costs. There are great ments have come from solar ener-hopes for the more efficient and gy. Who would have guessed five

years ago that the Europeans would be switching to solar water heating, that Third World countries would be adopting solar-powered water pumps and that electricity from photovoltaics would only cost It times more than conventional pow-

At the same time, there have been important developments in electrical and gas-driven heat pumps, in storage and transmission techniques and in insulation mate-

----Nuclear ----

going to play a key role in our ener-

raised over its safety, then about its nomic Cooperation and Development was confidently predicting that nuclear power would represent some 756 million tons of oil equivalent in 1985 compared to 35 million in 1972, it is now virtually certain that no more than 400 million will

be available at that date. some 60 percent of the whole community R and D budget.

Until now, the largest item has been research on nuclear safety carbeen research res

PARIS (IHT)—When the energy crisis broke in 1973, the stage times as important as existing oil seemed set for the arrival of nuclear power. For 20 years this miracle of would only come with last-breeder reactors. With conventional reactors alone, uranium resources would be worth less than half of ultimately recoverable gas reserves, it was claimed.

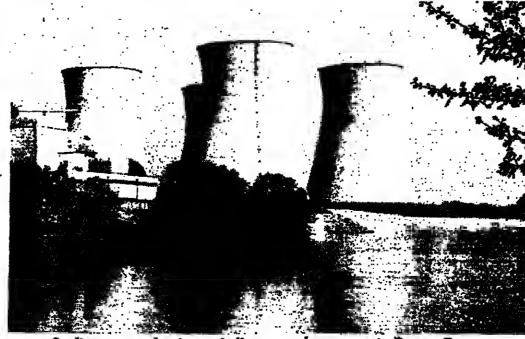
. "If we bring in fast breeders, our current stock of some 20,000 tons of uranium 238 are worth more than all Britain's oil, gas and coal resources put together," says Dr. Walter Marshall, deputy chairman

Poor Performance

Nuclear's poor performance is all the more surprising in that most of the technical problems associated with conventional reactors had ne available at that date.

Nuclear power had seemed the had been made, the industrial innswer. According to figures given frastructure established and the economic viability confirmed.

What nuclear supporters had not (Continued on Page 2)



Cooling towers dominate skyline at nuclear center in Bugey, France.

ONDON (IHT)-Only a decade after toppling coal as the world's major fuel, oil is finding that its days are already numbered. According to the Workshop on Alternative Energy Strategies. proven oil reserves now total only 658 billion barrels while ultimately recoverable reserves come to around 2,000 billion. U.S. oil production is already on the decline, and world production may follow suit in as little as 15 years.

For the consumer countries who have so recently switched to oil from coal, these estimates are disturbing. Not only is the West concerned over the growing dependence of consumer nations on a few Middle Eastern states, but the prospect of world oil reserves running out altogether is also a major wor-

If the oil industry had stuck to its traditional onshore production, the prospects might have been even bleaker. But in the early 1960swhen the Middle East fields were still under the control of the majors

and oil prices were at rock-hottom levels—the oil companies turned their attention to the offshore, where as much as 45 percent of the world's ultimately recoverable oil reserves are believed to lie. It was this decision that sparked off a ma-<used by the oil industry.</td>

When the U.S. companies began exploring in the shallow waters of the Gulf of Mexico just after the war, they merely transferred their onshore production methods to the sea. But as soon as oil and gas were discovered in the rougher conditions of the North Sea, traditional techniques had to be abandoned. Up to that time the U.S. companies had dominated the field, but with the North Sea discoveries, European companies started making important contributions.

In the exploration field fixed platforms had to be ahandoned in favor of floating ones. The first was semi-submersible platform an-

(Continued on Page 4)



The Role Nuclear Will Play in the Future Is the Key Question

reckoned on was the slump in electricity demand during the recession, the financial difficulties of the utilities at a time of soaring building costs, the growing environmen-talist opposition and the election of

President Jimmy Carter. When ouclear technology was first developed after the war, countries adopted systems that suited facilities, opted for light-water reacmodels. Canada, with expertise in heavy water, developed the Candu reactor operating on natural urani-um and cooled by heavy water. France and Britain chose the can produce enough enriched uragraphite-gas route using natural nium for a bomb in three days, uranium and gas cooling. When France acquired enrichment capabilities it followed that the provide should be a second-filling in followed the same acquired to the second-filling in followed the same acquired to the second-filling in followed the same acquired to the same acquired bilities, it followed the example of diffusion method three years, with West Germany and adopted light-water technology, while Britain merely incorporated enriched uranium in a development of its existing reactors—the advanced gascooled reactor (AGR). After experiencing considerable difficulties with the AGRs, Britain plumped for a mixture of the Candu system with a light-water boiling reactor, called a steam-generating heavy water reactor (SGHWR).

By 1973 it was already clear that light-water technology would be the system generally adopted for conventional reactors, with the United States, West Germany and France all possessing the industrial capacity to supply this type of reactor system. By 1978 the pressurized versioo licensed by Westinghouse seemed to be gaining ground over the boiling-water version of Gener-

Next Stage

If the problems with light-water reactors were only industrial, the same could not be said of the fuel cycle as a wbole or of the next stage of nuclear development, Gaseous diffusion was still the only uranium enrichment process working, while oo commercial reprocessing facili-ties were yet available. High temperature gas-cooled reactors and breeders were still in the experi-

The United States has just

by the West Germans, Dutch and British; South Africa and West Germany have brought our "jet oozzle" systems; the Americans are working on a new enrichment pro-cess involving the use of laser beams, while the French have presented what they claim to be a proliferation-free chemical route.

Whereas the gaseous diffusion system involves large investments their respective resources and tech-oologies. The United States, with a monopoly in enriched-uranium units with much lower energy requirements. But the French, who tors—either pressurized or boiling are currently building a large gase-models. Canada, with expertise in ous diffusion plant, claim the centrifuge will encourage proliferation.

"With a centrifuge system you

Reprocessing technology has been understood for years, but France is the only country that ac-tually has a commercial plant in operation. As their contribution to the non-proliferation battle, British and U.S. scientists have just suggested a reprocessing technique that would leave some dangerous fissile products in the plutonium to prevent it from falling into undesir-

Io 1973 it looked as if high-temperature, gas-cooled reactors, using a mixture of highly enriched urani-um and thorium as fuel, might soon become commercial. Operating at temperatures of around 950 degrees Ceisius, these reactors would have offered valuable beat for industrial purposes such as coal gasification and bydrogen production as well as

burned with thorium to produce the fissile uranium 233.

But the bottom fell oot of the market when U.S. utilities cancelled all their orders from General Atomics, and concern has since been expressed at the proliferation implications of these reactors. West Germany is now the only country that still attaches considerable importance to this technique: It is currently planning to build a combined reactor/coal-gasification complex in oorthern Germany.

Bot the fast breeder may well be the first to pass the finishing post. President Carter has, of course, expressed reservations about the breeder as part of his oon-proliferation stand, Britain still hesitates over moving to a commercial unit

During the last two years much
and West Germany has yet to pass research has gone into ways of re-

being more efficient in the genera-tion of electricity. Under this sys-tem uranium enriched to as much as 90 percent would have been phenix, which is due to come into service in the early 1980s. Fueled by a mixture of plutonium and ura-nium 238, it will be built in south-

> Alternative breeder technologies have also been examined, especially in the United States. With its experience in gas-cooled, high-temperature reactors, it is hardly surprising that General Atomics should have been examining a breeder version using the plutonium fuel cycle. In the belief that uranium 233 is less dangerous than plutonium, the U.S. administration has been looking into light-water and molten-salt breeders based on the thorium cycle. But it looks increasingly as if the liquid-metal system based on piotonium and uranium 238 will win the day.

ouclear power. The French have come up with their chemical granium-enrichment system, British and American scientists with a safer reprocessing technique and the United States has been examining the thorium as opposed to the plu-tonium cycle. Yet many people in the industry wonder whether it is really possible to prevent prolifera-tion once the nuclear business takes

Highly enriched uranium, plutonium and uranium 233 can all make bombs. Light-water reactors use only slightly enriched uranium, but the spent fuel includes plutonium, even if it is umusable until it has been extracted through reprocessing. Breeders using thorium instead of uranium 238 may produce little plutonium, but they manufacture uranium 233. By restricting sales of enrichment, reprocessing and breeding plants, proliferation may be postponed, but few believe

ducing the proliferation dangers of it can be prevented. If a country wants to produce nuclear weapons, it has much easier ways of manu-facturing the fissile materials than using equipment built for civilian ouclear programs.

Waste Disposal

The waste disposal question must, however, be solved if future generations are not to be endan-gered. With no viable techniques yet developed to store spent fuels from reactors, many people believe reprocessing is not only more ecocomical, but safer. Once the uranium and plutonium have been extracted from the spent fuel, the radioactive material left takes up so little room that it can easily be incorporated into glass cubes, inserted into inuge concrete blocks and buried in granite rocks, clay or salt deposits. The real threat to future erations may well come from

fuel-including highly radioactive, clements—that is beginning to high opening to pict of the more than the principle of the sion. Based on the principle of the hydrogen bomb, fusion is created, hydrogen bomb, fusion is created. by bringing together the bydroget, isotopes of deuterium and tritium at 100 million degrees Celsius, Degree terium is freely available in scare.

ter and trittum can be made from

relatively uncommon mineral, lithi-

um; but the process of maintain

difficult.
The problems involved are greater than those faced in putting a man on the moon," says Niels de Terra, of the International Energy Agency. "But if they are solved, the world will obtain a virtually limit

less source of energy." Two methods are being explored to attain fusion-magnetic contain ment and fusion by laser. Under the first approach hot gases are contained within a doughnut shaped device called the Tokamak by a magnetic field. Schemes of this kind are currently being pursued in the United States, Japan and the European Economic Com Under the second method, being tried in the United States, denter um-tritium pellets are bombarder

Hardware

by laser beams.

The IEA is sponsoring two multi-million dollar hardware projects in the field of magnetic confinement fusion research. One, which is being carried out in the United States, is designed to develop mate rials capable of withstanding the very extreme fusion temperatures; the other, which is taking place in West Germany, is trying to develop superconductor magnets of a spe never before attempted. Only recently Britain was chosen to carry out the JET fusioo experiments that are being financed by the

Fusion is still very much a dreamin the minds of scientists, but insion is very much a reality. Antiouclear forces may have a case when they argue that the world's energy oceds could be met without nuclear power, but others feel that their arguments may have come a little late in the game, For good orfor ill. Pandora's box has been ...M.P. opened.

Tapping Geothermal Power: Complicated, Expensive

geysers in Iceland, of the dry steam the areas enjoying goothermal pow-fields in California and nothern It-er are Iceland, Hungary, oorthern aly or the hot brines found in New Zealand. But what is oot generally realized is that geothermal energy can be found everywhere under the earth's crust, provided one goes There deep enough,

As a general rule, the earth becomes warmer by one degree Celsius for every 30 meters penetrated below the surface. So a depth of 3,000 meters is oeeded in order to obtain water warm enough for district heating.

However, there are many areas in the world where such temperatures can be found much nearer the surface. Volcanic regions like Ice-land are the most obvious sites, but there are many lesser-known areas where the exploitation of geother-mal power should be possible. According to a United Nations study, world geothermal reserves may be as much as 7,000 billion tons of oil

adopted the revolutionary high-speed centrifuge system developed than 6,000 megawatts of this power exploited.

DARIS (IHT)—When geothermal is being tapped, 80 percent of it in power is mentioned, most people immediately think of hot-water to electricity generation. Among Italy, the Paris region in France, New Zealand, Japan, Siberia, Chile and the West Coast of the United

> There are two main types of geothermal reservoir-those of low temperatures varying from 60 to 120 degrees Celsius which can be found at between 1,500 and 2,000 meters in sedimentary basins; and those of high temperatures varying between 200 and 350 degrees Celsius located in depths of a few hun-dred to several thousand meters in areas of relatively high volcanic or tectonic activity.

Hot Rocks

While the former, appearing in the form of hot water, can be used only to heat homes or greenhouses, the latter, in the form of either dry steam, wet steam or hot rocks, can also be used for generating electricity. Hot rocks exist everywhere, but

The areas most suitable for geothermal applications have already been exploited...And the exploitation of the hot rocks remains far too expensive for consideration in the short

Low-temperature geothermal only in some areas such as Stuttgart power is to be found in Iceland, are they close enough to the surface Hungary, France and the Soviet Union. Paris, for example, is sitting on a buge reservoir of low-temperature water. Europe's spas are oo more than geothermal fields.

steam at Larderello in oorthern Italy, at Valle Caldera in New Mexico and at the geysers in California, and in the form of wet steam or hot brine at Wairakei, New Zealand, at course, be found everywhere, but sumption centers and there are lim-

are they close enough to the surface to be exploited.

The use of bot-water springs for homes poses few problems except for the installation of piping to the houses and the corrosion caused by High-temperature geothermal the salinity of some of these waters.

In countries prepared to invest in a pipeline network to carry residual heat from power stations, factories and waste processing plants, water heated geothermally could easily be incorporated into the system. How-But for the moment little more are near enough to the surface to be Tatio, Chile. Hot rocks can, of voirs are often far from major con-

sion of equipment, but it also in-cludes unpleasant bydrogen-sulfide When used for electricity genera-tion, as at Larderello, the Califor-

nia geysers and at Wairakei, efficiency is only about 15 percent and waste is therefore much higher than with a conventional power plant.
At Imperial Valley, the corrosion problem is being solved by transferring the heat of the brine to another liquid such as isobutane through a heat exchanger made of special non-corrosive alloys and then reinjecting the brine into the

Complicated

Exploiting dry and wet steam is a more complicated business. Not

only may the steam have a high sal-

inity content resulting in the corro-

The exploitation of hot rocks poses major technological problems and remains uneconomic. At Los Alamos in the United States attempts have been made to extract heat from dry rocks by the hy-drofracturing techniques developed

is to the distances over which hot in the oil business. Two holes are water can be transported without drilled into the rocks, pressurized water is injected into one of them and, if a suitable connecting crack can be found, heated water or steam should then come up the

> Another technique is being tried out at Urach, oear Stuttgart, with the support of the European Economie Community. Under this method only one hole is drilled, into which two insulated tubes are inserted. Pressurized water is injected into the ooe and heated water or steam should then come out of the

The areas most suitable for

geothermal applications have already been exploited. Development hot-water pipeline networks based on waste heat from power stations could make new geothermal reservoirs economic, but their distance from major consumption centers will remain a problem. The use of geothermal power for electricity generation is economic only io favorable conditions such as at Larderello or the California geysers. And the exploitation of the hot rocks remains far too expensive for consideration in the short term.

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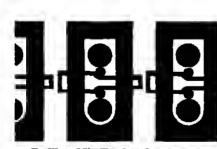
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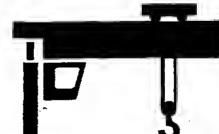
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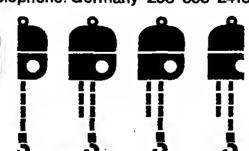
Rolling Mill Technology Rolling mills for beams, sections and wire-rod; strip and sheet mills.



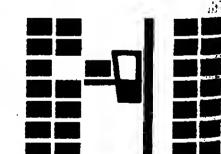
Tube and Pipe Making Facilities Plant and machinery for the production of seemless and welded tubes. Hydraulic presses.



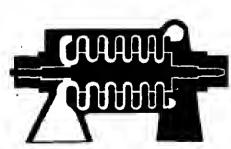
Cranes and Lifting Gear Overhead cranes, suspension cranes, steel mill cranes, KBK (modular crane construction) and suspension track



Components Drive angineering and control systems. alectric lifting gear, standard crane components and load lifting attachments.



Distribution Engineering Handling systems, high-bay warehouses, storage and distribution systems. Complete planning and tumkey



Compressors Centrifugal compressors or positive displacement machines for air, gases end gas mixtures



Compressed Air Systems Compressors, pneumatic tools and equipment for the building trade and Industry in general. Compressed air



Mining and Tunnelling Mining and tunnalling machines for hard and soft rock. Air motors.



Bulk Materials Handling Suckst-wheel excavators and stackarracialmars for handling or rehandling ore, coal, oil sand and minerals. Bett convayor systams.



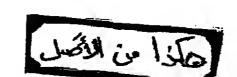
Construction Equipment Hydraulic excavators up to 109 t. mobile cranes up to 500 t, road finiahers



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Solar Power: Major Impact Unlikely Before Turn of Century

being used increasingly to heat homes. In the Third World solarpowered water pumps are giving new hope to farmers in arid West Africa. Solar power is becoming a

reality.

Earlier this year the U.S. government agreed to fund a 360-megawatt electricity generator-cum-heat-er based on photovoltaic cells to be used in a school in Arkansas. It will be the biggest plant of its kind ever built, and solar cells and concentrators supplied by Solarex will only cost \$6 a watt. Five years ago the largest photovoltaic generator was no more than a few kilowatts and the cells were costing as much as \$100. Now Motorola is reported to be supplying cells for an even larger unit at only \$5 a watt. It is the transistor revolution all over again.

It is the same story when it comes to thermal electricity generaors based on solar power. The Euopean Economic Community is unding a megawatt central tower lant in Sicily. The International inergy Agency is sponsoring two 00-kilowatt units in Spain—one sing the tower concept, the other a arabolic trough or distributed sysm. The United States is financing 10-megawatt tower unit in Bar-tow, Calif. The Sicily plant is exected to produce electricity at litemore than \$7 a watt.

Competitive

With the two systems running eck and neck, it may be only a hatter of years before solar-based lectricity becomes competitive 6th that produced from fossil hels. Electricity production costs tith thermal generators are not ex-exted to fall much below \$2, but .S. companies reckon that by the ciddle 1980s solar cells could be

testing as little as 50 cents. d"Even when the other capital directly, essentially for heating pur-vets are taken into account, this poses, or indirectly for producing lould put photovoltaics in the time range as conventional gener-sing methods," says Wolfgang collector or the focusing collector. uz, who specializes in solar ener. When electricity is produced, it can wat the EEC Commission. "At the either be from steam created by the doment electricity produced by above-mentioned systems or directanventional methods costs be- ly through photovoltaic cells. Of lieen 50 cents and a dollar per the three main systems, the flat bYet it is only the environmental- sun's radiation as a whole, while

energy needs, and 3 percent of those of the Common Market countries.

Solar power may be economically viable for water heating and swimming pools, but only in new installations. Third World countries without national electricity grids may be attracted by the lowcapital costs of solar power, but their purchasing power remains limited. For space heating and electricity generation the sun is still not an economic proposition.

"It is now economic to install solar water heating," says Albert Strub, research director on alterna-tive energies at the EEC. But whea it comes to space heating, many countries feel the money would be better spent on better insulation rather than on solar equipment."

Greatest Promise

Of all energy sources, however, the sun holds the greatest promise. Wind and water are, after all, the result of the sun's rays; wood and crops are nothing but short-term energy carriers; fossil-fuels are so-lar energy stored over the centuries. Rather than extract this energy indirectly, why not tap it directly?

So long as no solution has been found to the transmission of electricity over long distances, the idea of using the Sahara or the Arabian desert as the world's energy source must remain a pipe dream. The problem of widespread use of solar within consumer countries concerns the environmental impact as much as its cost. But in countries that are sparsely populated and have yet to develop national energy networks, solar power could well be the answer.

Solar power can either be used electricity. When used directly, two plate and photovoltaics absorb the os who believe that solar energy the focusing collector achieves

Although there is a considerable difference in the amount of direct shine received in various parts of the world, the amount of solar radiation as a whole varies appreciably only in the winter. Flat collec-tors and photovoltaics are therefore more efficient in northern climates than is generally thought, but un-fortunately their output is lowest at the very time when they are needed

The simplest example of the direct use of the sun's rays is the greenhouse. By using a black-plated collecting plate underneath glass—the so-called flat-plate collector—it is possible to achieve temperatures of 50 to 70 degrees. Celsius. With more sophisticated techniques such as vacuums and metal coatings, temperatures of as high as 250 C. can be attained. Flat-plate collectors can be used either directly for heating or indirectly for electricity generation. Electricity with this system costs about \$12 a watt, Mr. Palz claims.

Solar-focusing collectors were developed to maximize the heat from the sun's rays. They come in two forms—the central-receiver in and the linear- focusing or distributive-collector system. In the first, mirrors focus the sun's rays on a central boiler. In the second, they concentrate them on pipes containing liquid or gas.

Two Variants

There are two variants of the central-receiver system, the paraboloid concentrator and the central tower. Under the first, a paraboloid mirror of some 50 square meters tracks the sun, producing tempera-tures of around 500 degrees Celsius at its focal point. An example of such a plant can be found in Marseilles, while a larger version with fixed mirrors has been built at Font Romeu in the Pyrenees with tem-peratures reaching 3,500 to 4,000 C. Under the central-tower system, a number of rotating flat mirrors. or heliostats, are focused on a sepa-rate fixed boiler, Plants of this kind are being built in Sicily, Spain and France.

There are also two variants of the linear-focusing or distributive-collector system. Under the first, the transported within these same pipe-

Mexico for irrigation purposes, and a 500-kilowatt unit is due to be built in Spain under an IEA pro-gram. Under the second method, faceted flat-mirror segments reflect the sun's rays onto a pipeline sys-tem. The best example is a 360-kilowatt unit that stands in Marseilles. Under the central-receiver system, the apparatus must be capable of tracking the sun both hori-

zontally and vertically, while in the simpler linear-focusing system it needs only to move vertically. plain giass. The most exciting developments

DRUSSELS (IHT)—In Europe can play an appreciable role before more and more households are turning to solar water heating. In the United States the sun is the united by the pear of the united states the sun is the next century. Even by the year ing exclusively on the sun's rays are reflected from a parating exclusively on the sun's rays.

Differences

Differences

Sun's rays are reflected from a parating exclusively on the sun's rays.

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Sun's rays are reflected from a p The most promising semi-conduc-tor material is silicon, which has attained efficiencies of 17 to 19 per-cent. Better suited for higher temperatures are gallium arsenide cells, which can obtain energy conversions of 13 percent. But the real breakthrough could come with cad-mium sulfide. Although this mate-rial currently only offers efficiencies of little more than 5 percent, really caught on and distillation manufactured as a film on a conventional "float-glass" production line, it could become as cheap as used for air cooling and crop

For the moment the main de-

collectors, be it for thermal uses or for electricity generation. Water heaters based on this system have been operating in Japan, Israel and the United States for years. Now they are being introduced in Europe. Prices are still high at \$1,000, but they are falling fast. In sunnier countries collectors are used for space heating with a con-ventional back-up. In the develop-ing countries solar cookers never cases, but the sun's rays are already

lighting, generators are required. Some of these are based on flatplate collectors like the water pumps sold in West Africa by France's Sofretes or the same company's 25-kilowatt electric water-supply system for a town in Mexico. Photovoltaics are, howev-Mexico. Photovoltaics are, nowever, also used as in Niger, where school children can watch television thanks to sets powered by photovoltaic cells. Many people believe that photovoltaic electricity units may be the answer to poor rural areas in the Third World that cannot afford access to a national elec-

ing collectors are only really suitable in very sunny climates. For some time to come they are likely to remain uncompetitive with conventional forms of energy. Solar power is not likely to have much impact before the turn of the

century. Its main contribution in the developed countries will be in water heating. In the developing world, without a pre-existing energy infrastructure, the possibilities for solar power are enormous. However, some system must be developed that can be produced by these countries themselves rather than exported to them by the more

Gas: Long-Range Transport Costs a Problem

PARIS (fHT)—With world lines, probably in a mixture with far into the next century, and U.S.
gas production already on the decline, researchers are trying to those for oil, and they are better develop a new artificial gas that distributed. Some 40 percent of rewould incorporate the whole energy content of coal-synthetic natural

When gas was first used towards the end of the 18th century for street lighting in Europe, it was nothing more than a by-product of the transformation of coal into coke for iron smelting. Since it represented only part of the coal's energy content, its calorific value was low. Only in this century has this "town gas," with its harmful carbon dioxide content, been steadily replaced by natural gas with double the calorific value.

Natural gas is almost as precious as fuel oil. It has almost the same calorific value, it is extremely efficient when used for heating and conking, it does not contain any carbon dioxide and suffers from none of the pollution problems associated with oil or coal. A source for petrochemicals and fertilizers, it also, when converted into methanol, be used as a transport fuel. With new gasification techniques, it can be manufactured from oil or coal. Pipelines originally used to sup-

ply town gas can be adapted to carnatural or synthetic-natural gas. Eventually, if hydrogen becomes a key energy vector, it may even be

maining resources are reckoned to be associated with oil reserves, with 60 percent phassociated or dry. According to the Workshop on Alternative Energy Strategies, proven gas reserves are only 386 billion barrels compared to 658 billion for oil, but some experts reckon that ultimately recoverable reserves may be as high as the 2,000-billion estimate for oil. With gas consumption currently lower than oil, natural gas

Key Problem

may well outlive its hydrocarbon

But the development of natural gas as an alternative fuel to oil has been hampered by one key prob-lem—the cost of transport over long distances. Whereas oil can be shipped from one part of the world to another at little cost, the transport of natural gas can involve very heavy investment.

This is why oil companies often do not bother to develop dry-gas discoveries, why producing coun-tries with little domestic demand for energy are still flaring their associate gas and why electricity-gen-erating plants are so often allowed to burn gas when it could be used much more efficiently in domestic heating or in petrochemicals. With

so much of the world's gas re-sources located far from the main acy of France's Technigaz and Gazconsumption centers, transport is the key bottleneck to the increased use of gas.

There are three ways in which natural gas can be transported over long distances: It can be carried in its normal gaseous state in pipelines; it can be liquefied to a temperature of minus 160 degrees Celsins so that its volume is reduced 600-fold, and then transported in special tankers to its destination where it is reconverted into natural gas; or it can also be converted into methanol and shipped to its destination in this form

When the gas is to be transport-ed overland, the pipeline solution is invariably the cheapest in the long

The real difficulties arise when gas has to be transported across the sea. In most cases it will not even be possible to lay a subsea pipeline and the choice must lie between liquefaction or methanol conversion. The first country to face a major

transport problem was Algeria, which opted for the liquefaction route. It is in this field that most of centrated.

In the field of liquefied-naturalmarket has been dominated by two France, while in transport the one using steel with a 36-per-Norway's Moss Rosenberg is mak- cent-nickel content, the other stain-

acy of France's Technigaz and Gaz-

The original technology used for building LNG plants was the classical cascade process, which has been used in plants in Algeria and Alaska and is to be taken up again in Nigeria. Under this technique, three cycles and three different fluids (propane, ethylene and methane) are used to freeze the gas.

Under separate technologies de-veloped by Air Products and Technip, only two cycles are used—the former with propane in the one cycle and a hydrocarbon mixture in the other, while the latter uses a hydrocarbon mixture in both cycles.

in the transport sector, the membrane tank system developed by the French is competing with the selfsupporting tank used by other manufacturers. Under the mem-brane system, the LNG is carried in the actual hold of the ship, while under the self-supporting system it is carried in a spherical tank low-ered onto the tanker.

The first LNG ships were built nearly 20 years ago by the Conch group using the self-supporting the research has so far been con- tank technique. Two French companies, Gaztransport, subsidiary of Gaz de France, and Technigas, subgas (LNG) plants themselves, the sidiary of Gazocean-toyed with the idea of using a similar method, companies. Air Products of the but ended up developing their indi-United States and Technip of vidual membrane tank techniques;

the bulk of present-day LNG fleets. However, in the last few years Moss Rosenberg has been in the running with its self-supporting tank technique. A similar system, Semer, is being offered by Spain's Crinavis shipyard. The advantage of the self-supporting tank technique is that the spheres can be manufactured separately, although the French claim that membrane tank vessels are simpler, safer and

Disadvantages

There are three major disadvantages in liquefying gas. The cost of the installations and transport facilities are enormous: 10 to 15 percent of the gas is lost in the actual liquefaction process; and there is a danger of explosion occurring at the plant or on the tanker. It is largely due to this safety factor that thought has been given to the conversion of gas into methanol, for methanol can be transported in normal ships at virtually the same

However, the methanol idea has never really been developed,

One idea currently under consideration is to build a collector pipeline that would pick up gas from a number of smaller fields in the North Sea, Another, more farfetched idea would involve liquefying the gas on the spot using a floating plant.

The Hydrogen

For reasons of environment, and is the storage of hydrogen in the .o save energy, all sorts of new reearch efforts on power have been started. Mercedes-Benz is working on aspects of this large R & D field.

At the present state of technology hydrogen looks like being one of the future forms of power. Hydrogen is present in practically inexhaustive quantities in water, given the primary energy such as coal, required to extract it. Distribution of hydrogen in its pure form or as a mixture (town gas) offers no special technical problems. A hydrogen technology necessary to cover the present hydrocarbon energy requirement would however require considerable extension to the existing gas works and gas distribution or their reconstruction.

Hydrogen rechnology is especially favourable since like oil technology it can be used across the board as energy supply for domestic needs, industry and vehicles. It would seem perfectly feasible to have a combination of gas (hydrogen)/electricity for domestic and industrial purposes and, say, hydrogen/methanol for transport. For several years now Mercedes-Benz has been expenmenting with hydrogen driven vehicles in practical conditions.

The normal combustion engines of today can be converted from petrol to hydrogen with some technical alterations. The key problem

vehicle and Mercedes-Benz has already shown that some new ideas can be put into practice in running vehicles. The key word is: the chemical combination of hydrogen in the form of metal hydrides. This development is being encouraged by the Federal Ministry for Researchund Technology.

Hydride propulsion (hydride container - hydrogen engine) involves the following: the heat released during combustion (in exhaust gas or cooling water) has to be applied to the hydride to release the hydrogen which serves as fuel. On the other hand heat is generated when hydrogen combines with the metal (hydride formation, fuelling process) which corresponds to the motor combustion head previously srored in the metal.

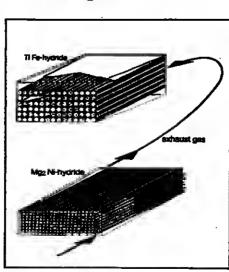
By means of appropriate combination of storage of various hydrides (working at various temperatures and pressures) the whole hydrogen tank can serve the following purposes:

- Fuel containers for a cruising range of about 200 km (already feasible) to say 400 km, in future with a 200 kg tank weight and a motor of 44 kW (60 h.p.).
- Air-condinoning and hence refrigeration inside the vehicle without surplus weight or any further use of fuel (use of warm air to free hydrogen from



hydride with simultaneous aircooling to -10°C).

- Hearing the vehicles is based on the principle that where there are hydrides at different pressures and latent heat levels, equalisation of pressure results in the release of latent heat.
- Heat storage and retrieval in the



fuelling process through the use of a combination of various hydrides. This permits a practical heat-free propulsion of the vehicle which is particularly important in underground. transport such as mines.

The hydride propulsion concept as developed by Mercedes-Benz enables one to store hear generated by engines and to choose time and place of retrieval (at fuelling) so that this fuel can be utilised.

This means that energy can be retrieved and used again e.g. in thermal power stations or zonal heating systems. The amount of energy retrievable is about 30-50% of the lower heat value of the fuel tank content. The prime energy use in rhe combination vehicle/district heating can therefore be raised from less than 20% (medium efficiency of engine) to over 50%.

The first world prototype of a hydride combination storage with all the functions mentioned above was

built at the end of 1976 and is under- use of primary energy through: going practical tests (Fig. 1).

As the above considerations also apply to stationary storage, hydrides provide efficient-heat (use of surplus heat) in the domestic energy supply and free air-conditioning (use of warm air to free hydrogen from metal hydride). Given gas supply in a town (gas with hydrogen content) and the ability of hydride to absorb hydrogen out of these mixtures, there is the possibility of fuelling vehicles at the domestic gas tap. This means a steady switch from oil to hydrogen technology which allows the use not only of a pure hydrogen propulsion but also of a mixture of hydrogen and petrol (Fig. 2).

As in future the best possible use of the still available reserves of energy will be still more important

than today, optimum use must be made of the supply of energy itself, and not only. in respect of vehicles and households.

The initial results of Mercedes-Benz experiments show already that with the help of hydrides. electrochemical accumulators can be made especially suitable for electrical peak load storage. Furthermore, with the help of

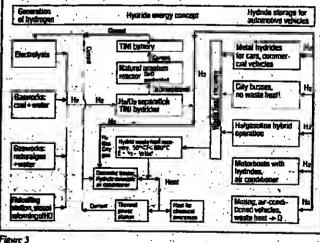
hydrides, heavy water for natural uranium reactors can be made on favourable terms, energy and price wise.

Apart from the good environmental aspects and its independence of oil, hydrogen from metal hydrides makes possible (see Fig. 3) an optimal

retrieval of waste heat from

- all combustion processes
- use of waste heat for heating and cooling
- reduction in use of energy in the production of reactor fuels (natural uranium instead of processed uranium through the use of cheap heavy water). This would mean that one could become to a large degree independent of the supply of enriched uranium and therefore of the nuclear super powers.

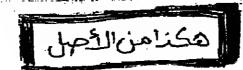
The production of hydrogen on a large scale would first be made through coal, possibly also gas; in the distant future these processes could be replaced by nuclear stations and possibly by thermochemical decomposition of water. As hydrogen technology has now got going as



the result of past successes, it is likely to offer many interesting possibilities and not only for vehicle propulsion.

Mercedes-Benz Engineered like no other car in the world.







Electricity: Seeking Methods to Reduce Inefficiency, Loss ...

ONDON (IHT)—Oil producers

are often criticized for flaring associate gas on their oil fields. But what is often forgotten is that consumer countries also waste valuable energy in generating their electrici-

About 65 percent of the energy originally put into a power station is lost in the form of waste beat and 10 percent through transmission losses. It is only when the curreat is produced by a hydroelectric system that the overall losses can be kept to little more than 20 perceat.

There is very little to be done about this. Under Carnot's law it is impossible to generate more than a certain amount of electricity at a specific temperature. The efficiency of an average power station is be-tween 30 and 40 percent, of a gas turbine or diesel engine 20 to 25 percent, of soft energies such as the sun, wind and waves 15 percent or

The answer might be to avoid using electricity where a primary fuel would do a better job. It may be perfectly justifiable to consume as much energy for a service which cannot be met by a primary fuel. There is nothing comparable to electricity when it comes to lighting, high-temperature industri-al applications, and domestic appliances. But there is no point in using electric heat in a room when primary fuels such as oil, gas and coal can do the joh so much more effi-ciently. Despite the fact that dociently. Despite the fact that do-mestic electric fires may be more than those using oil, gas or coal.

Upset

Although most people now agree that it is better to use gas or even oil, rather than electricity, for heatenergy market. They have been trying to find ways to raise the effi-ciency of electricity generation and reduce transmission losses.

Thanks to improved turbines, it is now possible to obtain as much as 40-percent efficiency out of a power station. By recycling waste heat through a second turbine and developing higher comhustion heats with high-temperature gas turbines or gas-cooled reactors, efficiencies of 50 percent can be achieved. Transmission losses can be achieved by increasing the voltage of the control o be reduced by increasing the volt-age of transmission lines or hy adopting direct current instead of alternate current. Research is being done on the possibility of making underground cables super-conduc-tive hy reducing them to sub-freezing temperatures. But that still leaves electricity a long way behind natural gas, which reaches the cus-

tomer at over 90 percent efficiency. Electricity company officials argue that houses will need electricity anyway and that electric appliances

efficient than their primary fuel. They point to the progress being rivals, the current feeding them is a second-generation energy.

They point to the progress being made with electric heat pumps that second-generation energy. air, and pump it inside. Although these pumps are better for air con-ditioning than heating, they are ex-pected to double the efficiency of electric heating. Finally, they argue that once current power stations ing, the electricity company offi-cials are understandably upset at waste will not matter. By that time losing so much of their potential it might be better to consume uranium 238 than what is left of oil, gas and coal.

'Domestic User'

"Every domestic user wants to use gas for his heating nowadays, but in 10 to 20 years there may not be any gas left," according to Dr. Walter Marshall, deputy chairman of the United Kingdom Atomic Energy Authority.

If utilities increased generation and transmission and if heat pumps were installed in homes, consumers would receive almost as much energy as was injected into the power stations in the first place. However, some of it would have come from the air outside. The only real competition that electricity would then face would be the gas-fueled heat pump, when it becomes commer-

There is one obvious way of getting more out of electricity generabut unfortunately it arouses little interest from utility-company directors. This would be to use the waste heat from the power stations Environmentalists will often argue that more electricity is now being generated than is really necessary. They are appalled at the waste in

burning fuels that could be directly put to use...

dangerous waste water, normally dumped into rivers or the sea,

could be put to a useful purpose. District heating is not a new idea: Houses in Paris are heated through waste incineration; in Lon-don, Whitehall is kept warm by wa-

to provide hot water and heating ter from Battersea Power Stations; for homes in the area. Potentially in Czechoslovakia waste heat from in Czechoslovakia waste heat from the Skoda factories is used to heat the local town. District heating sys-tems can be found in Warsaw, Malmoe, Odense and in the Ruhr. The West Germans are considering a national hot-water pipeline net-

Many people find the idea appealing. Not only could such a network take advantage of the enormous heat losses from power stations, but it could also use waste heat from factories, boilers and incineration plants. It could even carry geothermal heat or water heated

tice today involves using spare elec-tricity to pump water into a high reservoir for use at a later date as

hydroelectric power. The loss on such storage may however exceed 30 percent and suitable reservoirs

are not always available. Research

is now being carried out on storing

But many utility-company offi-cials consider that their role is to provide electricity, not hot water. They fear that the efficiency of their power plants may have to be reduced to keep the waste beat at the 90-degree minimum required for district heating. They point out the huge cost of building hot-water pipelines, the heat losses incurred during transport and the duplication of existing systems.

Huge Cost

British district-heating consult-ant Ernest Haseler rejects these criticisms. "Provided there is ap-

planes. It can also be applied to

power fuel cells or produce chemi-

cals. On an industrial scale, it can be stored as a gas, a liquid or with metals in a hydride compound.

while at the household level metal-

air batteries or titanium-hydride

storage tanks can be used. And all this from a by-product of water.

Cost

The only trouble with hydrogen is its production cost, its low calo-

rific value and its explosive quali-ties. Under current technologies hy-

drogen can be manufactured by the

catalytic cracking of natural gas or

through the electrolysis of water.

But whereas the first method con-

sumes valuable natural gas and

turns out an impure hydrogen

which is only suitable for industrial

are therefore examining ways in

which reasonably pure hydrogen could be produced at a lower cost

What appears to be the most

promising technique is a thermo-

chemical process. Various thermo-

chemical routes are currently being

examined at Ispra in northern Italy as part of a research project spon-

sored by the International Energy

Agency with EEC participation. At

a later stage in the project the participants will examine the feasibility

of using high temperature nuclear heat to produce hydrogen on the basis of a sulfuric acid cycle. An-

other idea that has also been con-

sidered is the use of the photosyn-

thetic apparatus of green plants or

algae for hydrogen manufacture.

—M.F.

than by electrolysis.

UKAEA's Dr. Marshall recognizes that combined heat and poser could make a contribution to Britain, but feels that it would be better suited to countries which are huilding new towns or are accus-tomed to living in high-rise apartments. "The introduction of comhined heat and power in 10 to 20 towns could save Britain some 20 million tons of coal a year," he

propriate hot water storage, unit-ties should be able to maintain the right water heat without lowering

"With modern insulating materials, heat loss up to 40 miles is less than with electricity cables. With four

houses to the acre the cost of in-

stalling pipes would only be £230 a house; with 40 to an acre only £176 a bouse," he adds.

A Celi

Some researchers are also look ing for an electricity-generating technique which would avoid the Carnot cycle altogether. At the moment two different methods are being examined that promise efficiencies of 50 to 60 percent. In the first, cells are used to produce electricity; in the second, electricity is produced by the power of a magnetic field.

Under the first system, a cell with two platinum electrodes is immersed in a solution of sulfuric acid. Oxygen is then fed into one electrode, and hydrogen, propine hydrozine, ammonia, methane or some other gas into the other. The result is electricity. Despite the cell'a early promise, nothing has been developed that would be suit able for electricity generation on an industrial scale.

Progress ia the second method magnetohydrodynamic generation (MHD), is even less advanced. Ion ized high-temperature gas is passed through a strong magnetic field a high speed, creating electricity. By placing electrodes in the gas, the electricity can be extracted.

Environmentalists will often at ue that more electricity is now being generated than is really: essary. They are appalled at waste in burning fuels that couk directly put to use, and they reginereased electricity consump as the justification for nuclear

Still, the only way in which a soft energies can be harnessed through electricity generati Many experts believe that the n important area for research is obtaining greater efficiency electricity generation, transmis

... But Storage Still Its Main Weakness

One of the main weaknesses of electricity is that it is difficult to store. Oil and gas can be stocked in tanks, uranium and plutonium in line with demand variations. in tanks, uranium and plutonium kept safe in special deposits, coal piled up on waste ground, water stored in a dam, but what can one do with electricity? Not only does this pose a problem for the utilities, but it represents a major obstacle in the development of alternative energy sources such as solar, wind and wave power. Storage is vital when production or demand may

At the moment electricity storage

This involves using small, but cost-ly generating units which can be brought into action at a moment's notice. The main policy has been to even out demand variations as much as possible by encouraging the use of accumulator heating and offering cheaper tariffs when de-

electricity in the form of com-pressed air, compressed hot water or in giant spinning flywheels. At the household level, heat can be stored in insulated water tanks, in the ground, in rocks or in certain chemical sahatances such as Storage Systems The only storage system in prac-A technique of interest to utilities and end-users is electricity stor-

age through batteries. Cells have been developed based on nickeliron, nickel-cadmium, silver-zinc, sodium-sulfur, hthium-sulfur and lithium-chlorine, but no system has applications, the second, which yet been developed which can be said to have a decisive lead over the traditional lead-acid battery used in a fuel, uses up an enormous automobiles.

Another possibility would be to store electricity with the help of large direct current superconducting magnets. Despite the refrigeration needed to maintain the superconducting state and the losses encountered in converting the current to and from alternate current, the efficiency of such storage looks like being very high.

Using Hydrogen

But what is arousing considerable interest among researchers is the idea of turning spare electricity into hydrogen. For hydrogen is a clean fuel, which can be reinjected into power stations, piped to customers like gas for heating or used as a fuel in motorcars and air-

Oil: Its Days Numbered

(Continued from Page 1) thored to the sea bed. Then came the drilling vessel, which was held in place by dynamic positioning. The latest development is a semi submersible platform with dynamic

In the production field, compa-nies were forced to build steadily larger platforms as water depth ed. Some were made of steel, others of concrete. Large barges were developed which could lay pipelines on the seabed at greater speed and under tougher weather conditions. A whole new industry merged combining the skills of the hipbuilder and the engineer.

Deeper

However, the companies have ound that as they have made disoveries in deeper waters, traditional production methods have be-come increasingly cumbersome and costly. A platform now being built by Shell in the Gulf of Mexico is arger than the Empire State Build-

With limited cash at their disposal the companies are looking increasingly to cheaper systems that would allow production to be carried out on the seabed instead of from the sea surface. In this way here would be no need for a costly fixed platform, only for a floating

There are basically two concepts of a subsea system—the dry and the wet. Under the former, an atthe dry and onto the wellhead permitting routine intervention by maintenance engineers lowered in transfer bells. Under the latter, operations are remote-controlled with a backup system permitting human intervenion in an emergency.

U.S. companies such as Lockheed and Cameron Iron Works have been developing dry systems. A Lockheed version is just about to come onstream at Garou-pa in Brazil.

The French and Exxon prefer the more complicated wet systems. France's Comex Seal installed a wet system in the North Sea, Elf/Aquitaine recently tested its own version off Gabon and Exxon is working on yet another de

While the supporters of the dry system feel it is simpler to reproduce onshore working conditions on the seabed, those backing the wet method argue that it is safer fo.
both the companies and the mantenance staff not to rely on routine
human intervention in such deoths.
However, production technology

is act keeping up with the advances in exploration techniques. While production has reached only 1,000

With limited cash at their disposal the companies are looking increasingly cheaper systems that would allow production to be carried out on the seabed instead of from the sea sur-

fect, exploration is now moving into the 3,000-foot region. But with new floating platforms attached by wires to the seabed and the subsea stems described above, the gap is likely to close.

if the difficulties of getting onshore permits and the desire for diversification of supplies have driven the companies into the offshore, the sharp increase in oil prices has made the companies more conscious of the need to improve their oil-recovery methods. Unless special methods are used, as little as 25 percent of the oil reserves may be recovered.

under secondary-recovery methods that are already widely practiced, another five-to-10 percent of the oil can be recuperated. The most common methods used are the injection of water, compress air or gas. Water is the cheapest of the three systems, but the use of associated gas may be attractive to producers in the Middle East or the North Sea as they can gain the ad-ditional benefit of reducing flaring.

Enhanced recovery techniques which are now being developed within the industry should bring recovery rates to as much as 40 percent. Under one technique chemi cal fluids are injected into the well, altering the oil's viscosity. Under another, the same effect is achieved by raising the temperature of the oil through burning part of it or by injecting steam once the oil has been thinned, making it more difficult for the oil to cling to the rock pores. However, with today's oil prices these techniques remain ineconomical.

Although it may be that current estimates of the world's recoverable sort of energy contribution that oil reserves are too pessimistic, it is now certain that the first expecta-

tions of oil that would be availa from shale and tar sands were reverse. According to answers gi by energy experts to a poli taken the Institut Français du Petrole, reserves from shale total 2,800 lion barrels, while those from sands and heavy oils total 2,100 lion. But very little is exploits under current technology and p

Huge deposits of shale exist the United States, Brazil, Cana Burma, the Soviet Union and C na. But if kerogen in the rock t be easily converted to oil hy he ing crushed shale in a retort at 4 Isius, even the best deposits of yield 30 gallons of oil for every! of rock. Those 30 gallons also quire 90 gallons of water. With t system, oil production from sh causes much the same environm tal problems as strip-mining without the same return.

In Situ

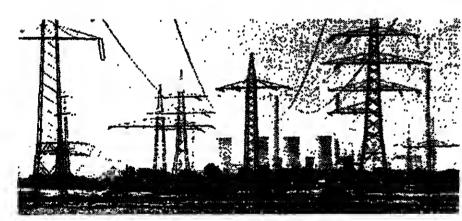
More promising, at least for lo er-quality shale, is the idea of he ing the shale in situ and pumpi out the oil produced. But so far a industrial mining operation b gotten off the ground.

Progress on the exploitation (more encouraging. In Canadi where the world's largest tar-san reserves can be found, 50,000 be rels per day are already being produced by Great Canadian Q duced by Great Canadian Q Sands, and another 125,000 bpd a due to be extracted soon by Sy

Ia Veaezuela, where her reserves of heavy oil have be found in the Orinoco Basin, the Company of government is considering last scale exploitation. Although A duction costs are near custo world prices, problems similar-those with shale have arisen. Mo of the oil lies too deep for suffer mining and must be recovered b in situ methods. Water flooding thermal means and diluents at being investigated as methods for separating oil from undergroun

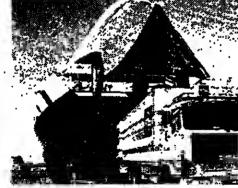
Most experts find it some absurd that enormous sums should be invested in the offshore in the Arctic regions and in the field of tar sands and shale when Middle East oil can still be produced at un der a dollar a harrel. Even today, when oil prices have reached \$11 to more, most of these resources to main uneconomic. Only if oil p rise substantially, they feel will shale oil and tar sands make the was originally expected of them

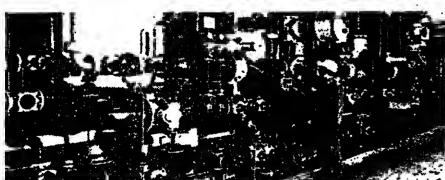
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A Future for Coal, the Cinderella of the Hydrocarbon Family

ONDON—Industrial society sources are reckoned to be almost only really began in the 18th 50,000 billion barrels of oil equivacentury when coal replaced wood in the smelting of pig iron. Since then it has been used to power rail-ways and ships, to supply heat for industry and homes, to manufacfure chemicals, town gas and elec-tricity. Although little by little, coal has had to give way to oil and gas, it was only in the late 1960s that it lost pride of place as the world's

main energy source.
When future generations look back at the oil/gas era, it may appear as nothing but a brief aberration in the long reign of coal. Ac-cording to forecasts made by the 1974 World Energy Conference, economically recoverable resources are six times those of oil at 3,000 billion barrels of oil equivalent, ultimately recoverable resources 12,000 billion compared to only

But unfortunately coal suffers from many disadvantages: It is difficult to extract, especially when it lies underground; mining can dis-figure the landscape and use up valuable water supplies; transport and handling are awkward; com-bustion releases dangerous sulfur dioxide, ash and particles. Only if these handicaps can he overcome, can coal resume its traditional role.

When it comes to production, the main difficulties arise underground. While high output can he achieved on the surface thanks to buge excavating machines, in the pits miners have to work in difficult conditions to extract much smaller volumes of coal. As the better seams are exploited, underground extraction could become even more

But even io underground mining, Europeans have much to learn from the United States, where productivity per man is three times as high. If coal is to have a future, productioo techniques must be-come as advanced as in the oil iodustry. This means greater mechanizacon, more efficient cut-ting methods, better underground transport facilities, safer working

cooditions and fewer mioers under-

ground.

of organization as of technology. Io Britaio and the United States special train delivery systems have been organized between pit and power station. U.S. coal companies have developed slurry pipelines, which carry a mixture of coal and water over long distances. The French are developing a special port at Le Havre which can receive

al coal trade.
The greatest obstacle to the development of coal is, however, the environmental prohlems it raises— from the damage done by strip mining to the sulfur-dioxide fumes emitted by power stations and boilers. Land reclamation is essenoally a question of the amount of money a society is prepared to spend to maintain a certain quality of environment, but technology may well be able to solve coal's pol-

lotion problem. Pollutants can be recovered from coal at three different stages be-fore combustion, during combus-tion or after combustion. Uotil oow research has tended to concentrate on the last phase when the fumes are just about to enter the atmosphere. At first utilities only had to build their chimney stacks high enough so that the pollution was

national Energy Agency is pushing the development of an internation-al coal trade. Obstacle to the deover 50 percent of the pollutants. This cuts the efficiency of a power

More promising is a process under which the pollutants are removed during combustion. This is the fluidized bed comhustion system currently being developed by a consortium made up of Britain's National Coal Board, British Petrolemm and the National Research Development Corp. m a project sponsored by the IEA.

Uoder this system coal is burned in a bed of mineral particles, which are kept in a fluidized state through the injection of a high-velocity flow of gas. The advantages of this form of combustion are that almost all the cost is humed (including the pollutants), that lower temperatures are required and the boiler

vestments needed for major hydro-

electric projects and may also be re-

luctant to interfere with existing

oavigation or fishing activities. With only limited local electricity

demand and with the difficulties of

transmitting electricity over long

distances, hydropower is not eco-

comically viable in many of these

The exploitation of water power

through hydroelectric schemes is

limited essentially by cost. Long-

distance transmission of electricity

remains a subject for research, but

it is difficult to see how the efficien-

cy of the turbine generators could be raised much above the 90 per-cent levels already attainable. Re-

search work has therefore shifted to

other less conventional sources of

old water mills were to give way to

hydroelectric schemes, why should not the old tidal mills be replaced

by large tidal power stations. For

more than 10 years the French have

operated a 240-megawatt plant of

One idea is the use of tides. If the

remote areas.

water power.

can be much smaller than a convencional one.

Another approach would be to remove the pollutants through pro-cessing the coal before combustion. This can be achieved through re-ducing the coal into solvent refined coal (SRC) or through transforming it into low-quality gas. Gas conversion could be carried out through a conventional town-gas

process or directly in situ. But if utilities are going to convert coal into oil or gas as a means of reducing pollution, they might as well use these fuels directly rather than burn them in power stations. It is extravagant to use up 35 persent of the only a second of cent of the coal's energy in gasification or liquefaction only to waste 75 percent of what is left in electricgeneration and transmission.

Manufacturing SNG

Of course, if coal is to be used as direct fuel to replace natural gas a direct tuel to replace halling gas rather than as a low quality coal gas for power stations, it will have to be upgraded. Until now synthet-ic natural gas (SNG) has been manufactured from naphtha, but with increased cost of oil, research is oow being concentrated on possible coal conversions.

The first research on manufacturing SNG from coal was based on existing town-gas technologies.

Of the three main techniques—Lurgi, Koppers-Totzek and Winkleronly the Lurgi process operated atthe high pressure required for the upgrading process. It was therefore adopted by the National Coal Board in successful trials carried out at Westfield, Scotland, in 1974. A more efficient version with a socalled slagging gasifier is currently being tested at the same center. The main aim of these experiments has been to widen the range of coals that can be converted in the Lurgi gasifier. Meanwhile Koppers-Totzek and Winkler are reportedly trying to develop high pressure versions of their systems.

But a whole new generation of gasification systems is now being developed in the United States that promises to be much more efficient. Whereas the Lurgi process uses fixed bed combustion and opgrading is carried out by methane

Hygas, Coga, the C02 Acceptor, Synthane and Bi-Gas. **Coal Liquefaction**

Less advanced are the coal liquefaction techniques. The conver-sion of coal to a liquid involves either the addition of hydrogen or the removal of carbon. Processes involving the former include direct hydrogenation, solvent-extraction hydrogenation, and the indirect use of hydrogen in the gasification synthesis. Pyrolysis processes are an example of the latter route.

While large-scale liquefaction plants have been built using the above processes, only one plant, that of Sasol, is currently in operaoon. This plant uses the gasifica-tion-synthesis route involving gasification through the Lurgi process followed by the Fischer-Tropsch synthesis. But now that oil prices have risen, interest has been re-vived in all these technologies.

Sasol is now building a second plant. A 545 ton-per-day demonstration unit is being built by hydrocarbon research using the H-Coal direct-hydrogenation process, and detailed designs are proceeding for similar large demonstration units for the Exxon Donor Solvent (solvent extraction-hydrogenation) and Cogas (pyrolysis) processes. (Britain's National Coal Board is also working on a solvent extraction process requiring less hydro-gen. The process is called Supercritical Gas Extraction.). The major technical problem with all routes apart from gasification synthesis is the separation of undissolved coal and residual matter from coal liqnids and solvent.

Although the NCB has developed a process for producing as much as 50 gallons of oil per ton of coal, it remains uneconomical "There is little scope for cutting li-quefactioo costs," says David Dainton, director of NCB's coal research center at Cheltenham. "It will only become economic when

One of the main problems in manufacturing synthetic fuels is the energy consumed in the process. As much as a third of the coal is burned in gasification, a similar amount in supplying the hydrogen for liquefaction. One answer could synthesis, the new systems involve be to use the heat from high temfluidized bed combustion and up- perature nuclear reactors for the

considered in West Germany, a 750-megawatt pilot high-tempera-ture reactor will be used to produce both coal gas and synthetic oil

Coke, Electricity

Coal today is used essentially for making coke and electricity. Uotil now it has been generally assumed that increased coal use would be limited to these two sectors. But a growing oumber of experts argue that when it comes to space heating it would be cheaper to convert coal into SNG rather than generate electricity with it. They also claim that SNG is cheaper than imported LNG if taxes paid to the govern-ment are excluded. But it is quite possible that coal may even have a future as a direct fuel for heating,

at least for factories. Coal has been steadily abandoned as a heating source because it is impractical, inefficient, dirty and polloting. Recent research suggests that this need not oecessarily be so, however. Already finely granulated coal can be pumped into a customer's fuel tank from special trucks in much the same way as oil can. With fluidized bed combustion, factory boilers can be smaller, more efficient and less polloting. Even in the home more efficient heating appliances and smokeless fuels are making coal a more attrac-

tive proposition But five years after the oil crisis the future of coal still remains very uncertain. It is difficult to persuade utilities to go back to coal when oil is so much more convenient and ouclear power within their reach. After abandoning coal for oil, industry is not going to change back overnight and households are oow committed to the oil, gas or electricity systems they have installed. With the constant threat of strikes by miners, the environmental damage done hy mining and pollution and the effect on the atmosphere of growing carboo dioxide as a result of coal combustion, this is hardly the ideal fuel,

But amid all the pronouncements of doomsday men, it is useful to re-member that if we are prepared to pay the price, coal can provide all the services now offered by oil and gas for centuries to come. Coal may be a Cinderella in the hydrocarboo family, but its time will surely

Wind, Water, Wood: Searching for a Better Harness mentalists. Developing countries have enormous possibilities, but they can rarely afford the huge in-

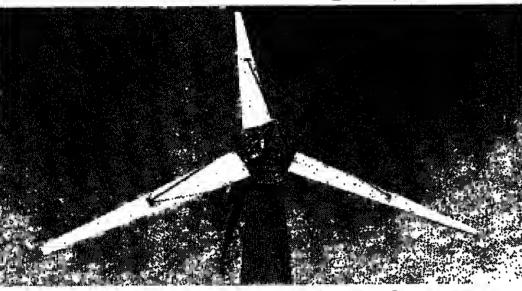
BRUSSELS—Uotil the discovery of the steam engine in the 18th century, man relied essentially on wind, water and wood for energy-wind to propel ships, water and wind to power corn mills and water pumps, wood for iron smelting, cooking and heating. The energy created was small, but it was sufficient to meet the modest oeeds of

non-industrial society.

Now that the fossil fuels that have played such an important role in industrial society are in danger of running out, the questioo is being asked: Should we oot return to these three by-products of solar епегау?

Some environmentalists advocate the trimming of energy oeeds to what they were before the intro-duction of fossil fuels, but most advocates of these soft energies are looking for some way of reverting to them without lowering living standards

Of the three energy sources, only water plays an important role in developed countries today. Whereas our ancestors could extract very little energy from their water and tidal mills, the development of turbines has opened up the potential of hydroelectric power. To this day oo cheaper source of electricity has



Waiting for the wind are these blades of an experimental aerogenerator.

way, Sweden, Canada and Brazil, hydropower remains the main source of electricity generation. In the Third World the potential for hydropower remains largely unex-ploited. According to the 1974 World Energy Conference, the world's hydro potential is 2.26 mil-

na is thought to have a hydro po-tential of 330,000 mw, the Soviet Unioo 269,000, the United States

pacity totals only 307,000 mw. Chi- total energy oeeds compared to harely 2 percent today.

But there are reasons why the 186,000, Zaire 132,000, Canada full potential is unlikely to be 94,000 and Brazil 90,000. Yet even exploited. In developed countries if all these resources were devel- the best sites have already been tak-

this kind at La Rance, oear St. Malo in the northwest of France. About 30 sites suitable for tidalpower stations exist in the world,



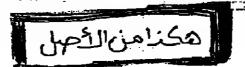
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Interview: 'We Need Growth . . . and Energy Creates Growth'

MANNHEIM, West Germany er output while decreasing the (IHT)—When the Hannover harmful effects on the environfair, one of the most important in-dustrial trade fairs in the world, is held this month, it will inaugurate a program on energy systems with more than 300 lectures by special-

ists in the field. The initiator and chairman of this program is Hans Freilaender, deputy member of the board of directors at the German subsidiary of Brown, Boveri & Cie., whose products extend from power plant equipment and household appliances to solar-heated homes.

As a representative of the energy industry, Mr. Freilaender was in-terviewed by Thomas C. Lucey of The International Herald Tribune.

Mr. Lucey-You recently quoted the 1975 figure for total energy investment in West Germany, some 15 billion marks (now worth \$7.5 billion), and pointed out that it was almost half the total figure for all investments by industry in this country. Does this ratio still hold

Mr. Freilaender—The 1976 fig-ures are not yet available from the Federal Statistical Office in Wiesbaden, but according to the IFO economic institute, industrial asso-ciations and other sources, it is still about 50 percent of all investment

or maybe slightly less. Q—What do you expect for investment in 1977 and 1978?

A-The problem is that we have had a construction stoppage, not an official one but a practical one, for building of all power plants in

For example, BBC was working Federal Republic (of Germany), A—It is not how much coal we on a filter for a coal plant in Westphalia that would increase the pow-

ment. However, an engineer brought a legal complaint against the project and it was upheld by a court in Muenster that stopped all work at the site.

Q-What do you mean by an

unofficial construction stop?

A—The specifications for building power plants are contained in an administrative rule giving tech-nical specifications on air pollu-tion. It is binding on the builders. But the administrative rules do not bind courts, who can make their decisions by other standards. So if someone protests about the building of a power plant and takes the matter to court, the decision need not be based on the standards that the builders were required to

So power plants are not being built in West Germany. Work on the sites has stopped.

These contracts are very long-ranged. There is a large capital in-vestment in machines and highly, very highly, qualified workers. When there is a construction stop, the capacity of the factories stops and the capacity of the workers stops. Things are running idle. Now we are in a situation where we must consider if we can keep this many qualified workers.

Q-How many people are affect-

A-in total, someone has worked out these figures: power plant workers alone, 40,000; primary three years. This has stopped the suppliers, another 40,000; with all others, a total of 200,000. If no more power plants are built in the

One of the problems is that nuclear plants have been compared with gy creates growth. Those who oppose building new power plants accept that growth is not needed, with all that implies. The results would be overwhelming.

So, instead of having the needed and the compared to the compare

pected to increase by .7 percent for

cumstances can it slowly be re-

plant capacity in this country must be increased by about 30,000 mega-

watts by 1985. Is this figure still up

and secondary energy?

public is now a country with the ful coal supply is essentially smaller highest labor costs—second only to than the actual coal supply. Sweden and practically no raw materials. We can keep our indus-tries only through high-quality and reasonably priced energy. If there is only expensive energy, it would considerably damage this country.

In the future, we will still need electricity, whether we are using wind or whatever to make it with. So we will need electrical power plants. The question remains, from what source.

Electricity is easy to use. It is easy to transport, available where it is needed without storing it and additional facilities are not needed. You don't have to burn anything. It's available by pressing a switch.
It's clean and doesn't create dirt.

Q-Now Germany depends mostly on coal to make electricity.

A-Yes, almost 60 percent comes form coal and a little more than 7 percent from nuclear energy. O-How much longer can you rely on coal for electricity?

A-It is not how much coal we strophic than this. The Federal Re- nomically feasible to use. The useprobably not be reached in the

Q-Has the race already been You noted recently that the

Coal plants have comparatively shorter building time, so they may be able to fill the energy difficiencies in the 1980s. Nuclear plants require much longer, eight to the control of the energy needs of the 1980s be filled without nuclear power plants?

A—That is hard to say.

Q—Do you feel you have the need for primary energy in West Germany from 1980 to 1985 is exeach percentage point in general economic growth. At the same time, the use of electricity is inquire much longer, eight to ten years from the time of getting the first building permit till the elec-tricity is in the grid. For a coal creasing about two points higher than the real increase in the GNP and only in the most favorable cirplant, that would take five to eight duced to the same growth rate. How do you explain this difference

There are now plans in Bonn and in growth rates between primary at the state level to build new coal plants. Permission for one has al-ready been given and we figure that there will be some others. I don't gy. At the same time, the need for electricity is increasing through the trend to rationalization, which is replacing work by hands with work by electricity.

there will be some others. I don't conclusions about nuclear power plants than the people in the field.

Q.—Do you think more can be done about energy conservation?

A.—For independent there will be a lack of energy before 1000. Q-You have said that the power growth rate until 1985.

We need growth for industry, for our obligations to the workers, to the old. We need growth for our international role and for our domestic obligations. Without growth, the A-It is still current, but it will financial performance by the Fed-

Growth creates energy and ener-

30,000 megawatts by 1985, we will have maybe 20,000 to 25,000 be-cause of the construction stoppage. If permits were given for new nuclear plants this year, the plants would not be in use by 1985, and it was just reported that the permission for the reactor at Neupotz can no longer be expected for this year,

Q-Do you feel you have the support of the political parties, especially since the two coalition partners in the government have been divided over this issue?

A-Both have said nuclear energy is essential, so nuclear energy is politically acceptable. Of course, there are other groups, such as the environmentalists and the courts,

Industry has always been forced to save energy because it had to make a profit, to fulfill contracts using as little energy as possible.

But I don't think the government should force people to save energy. It is possible to save secondary energy in the private area by increasing awareness of it. But not, as someone has said, by turning off electricity at the peak points of use. if the housewife can't cook at a certain time she will cook the same meal earlier or later.

and then divide up the shortage, everything that could go wrong Government must protect available would go wrong and no one workenergy at bearable prices, and this ing in the plant would do anything cannot be done if it does not say about it.

And remember, in all the accino to power plants so that in a certain year there are shortages. This cannot be the goal of politics.

Q-But many people are still very concerned about the safety of nuclear power plants. A-First of all, radiation from a

plant is far under the normal amount of radiation in the atmosphere. The possible source of dan-

ger is that men in the plant could pend on nuclear plants for its energy, where will it get the uranium? lose control of the process—but that must be full loss of control and A-There are a few sources in all safety measures fail. That means the Federal Republic, but certainly It is not the function of govern-ment to create a shortage of things thing to prevent the danger. That not enough. So we are dependent

> dents up to now, no one outside a plant has been injured. The damage has been contained inside.

One of the problems is that nucelar plants have been compared with the nuclear bomb, which is very destructive. A nuclear plant is

Q-If West Germany must de-



Hans Freilaender

on foreign supplies. Q-And face the risk that these supplies can be stopped at any time?

A-I think we will come to de-

pend on the breeder reactors. Q-And with them the risk that some people will say the Germans

are making nuclear bombs and have hidden them. Do you think this country would be able to live with this kind of political pressure from, say, the Americans and the

A-I think we could live with it.

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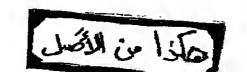
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Interview: Society, Politics, Economy Will Shape Technology

WASHINGTON—Dr. Bruce Murray, who bolds a Ph.D. in geology, is director of the Jet Propulsion Laboratory at the Califorma Institute of Technology. Dr. Murray was a Guggenheim fellow and has won recognition for his work on the Mariner space program as well as a number of awards from the scientific community. He has published often on energy technology far professional journals. Here, Dr. Murray discusses the role of technology in energy with J.P. Smith for the IHT

ith What role will technnlogy play in resolving the problems posed by energy shortages in the years ahead?

Dr. Murray—The right way to look at technology is not necessari-ly what kind of devices are coming along, but rather what kind of economic and political factors loom no

There are no easy answers-no technological quick fixes. A more valid question might well be, What are the drivers for technological change? There are, for example, several interesting drivers that will not only stimulate the development, but the absorption of new energy technologies as well.

Q-What are they? A-First, and quite important is the growing consciousness that we face a shortage unless something is

Second, there is a recognition that very large-scale economic and political enterprises, typified by the dimensions of the international oil market as we know it today, may be reaching the limits of scale. There are simply a lot of indications that the system is creaking. The economics of scale apply in theory, but in reality they face pronlems over the next 10 to 20 years. New energy technologies—such as solar or geothermal—will come on stream because of this.

Q-Are you saying that political factors and economic conditions will force the shape of technologies to a greater extent than most peo-

ple expect?

A—Yes, in a sense. New technoingies and refinements of other energy systems which require global multinational cooperation for their development and utilization may face increasing costs. These higher costs, in turn, become driviers for regional, smaller-scale solu-



Bruce Murray

Q-Could you give an example of regional forces in energy-technology development?

A-Yes, geothermal is nne obvious example. Geothermal deposits frequently have awkward and significant environmental side effects time, the benefits of turning to geothermal steam to generate electricity are also retained regionally. The rate at which geothermal energy is developed will in large meaperceptions are of benefits to a given region.

Another example is solar energy, which is a regionally variable resource. The rate of development again here will be governed by re-gional drives, as well as by govern-

Q-Do you think then that decentralized solar systems will be competing with coal and ouclear centralized systems?

The storage questioo is simply too unwieldly. A reliable electrical system will require that both of them go together. It is more likely that we will evolve a new kind of electrisources nr perhaps others. We will either go to a totally centralized electrification grid, much like what we have in the United States today, or a new kind of electric grid that would mix different components. In the end, it depends on the rate at which solar electrification is intro-

Q-How soon dn you expect solar-electrification devices, nr. say, photovoltaic cells, to come nut of the laboratory and into the market-

A-There are barriers to utilization of solar energy, and I think it is important to understand them. One genuine barrier is the investment that has already been made in pipelines, electrical transmissinn systems, and large-scale power plants. If we go another 20 or 30 years along the direction of everincreasing generation of electricity from fossil fuels, we may be in an irreversible posture. There may be a point of no return when the capital out ays required to introduce a really different energy technology like solar electric simply exceed what the then more-brittle economy can muster. We certainly are that present a problem, such as a nnt there yet, but it is difficult to disposal of brines. At the same set time scales. Changing into a large-scale use of solar energy is going to take a lnt of time. I am not optimistic that change will occur very rapidly unless we can provide positive incentives to various sure be determined by what the groups and factions, to help them evolve their ways of doing things.

Q-Earlier you said that there is a growing recognition of economic and political limits that could infringe developing technological solutions to our energy-supply problems. Are you talking about nuclear

on the other hand, the rate at which ouclear, coal and fusion are developed is likely to be less dependent on these regional forces.

A—Yes. Nuclear power is certainly an example of it. Analysis completed 10 tn 15 years ago indicated that nuclear energy mould be cated that nuclear energy mould be completed. our best and least expensive source of energy. Obviously, some of these assumptions have broken down because of problems that have surfaced through the political process A-In a sense, yes. However, I and elsewhere, such as siting and cannot conceive of a totally solar-nonproliferation concerns. The reelectric society in the oext decades. sult is that nuclear power today is being introduced at a much slower rate than was foreseen, and costs again are much higher than were anticipated.

Q-How can these problems be cal grid, or system, that mixes coal overcome, what contribution can

ar development?

A-Waste disposal is a crinical questing that affects not only siting but the questing of proliferating nuclear weapons. It is imperative. I waste-disposal systems that can be

technology make to avercoming these publical limitations on nuclear ar development?

In manner in arder to garner public support and acceptance for nuclear technology. Obvinusly, some counternal cou tries will respond to these questions at a different rate. The United States now, for example, is moving away from developing nuclear powbelieve, that we develop nuclear er in a sense, while nthers, in my view, are embarking on a wide-

along as intended, but the problem is that the relationship between technology and society has not been anticipated. There is still a nagging credibility gap between the people and industries in countries people and industries in countries.

out resolving the waste-disposal gap can be overcome in a positive problem.

Nuclear technology has come of energy—the nuclear business

where it is deployed. Unless this we can expect many small ones?

single answer. What will happenin other words the kinds of technology we develop-will reflect the preferences, expressed one way or another, of the people of various countries regarding their environ-ment, their health, their material standard of living, and their atti-tudes towards their descendants.

Wind, Water, Wood: Searching for a Better Harness

(Continued from Page 5)

with an estimated energy potential of as much as 64,000 megawatts. Among the most promising are the Severn estuary in Britain and the Bay of Fundy in Canada.

But tidal-power stations are very costly, the varying head of water reduces efficiency to less than 25 percent and nobody knows the environmental implications of interfering with tidal flows. Although serious thought is being given to a Bay of Fundy development, it is significant that the French are ant going ahead with the larger tidal plant they had planned off Mont St. Michel

The exploitation of wave power is considered more promising, espe-cially by the British and the Japanese. Under a plan backed by the International Energy Agency, Japan is hoping to obtain electricity from turbines installed in a buoy out at sea. In this system, the tur-bines are oot driven directly by the waves, but by air pressures created

The British government is currently examining for hydraulic sys-tems the Salter Duck, the Contouring Rafts, the Russel Rectifier and the Air Pressure Rius Buoy. Under all these systems the force of the waves is converted by hydraulic and mechanical means in such a way that it can power an electricitygenerating turbine. The Salter Duck technique is currently being tested at Loch Ness in Scotland while Hovercraft inventor Sir Christopher Cockerell is experimenting with the Contouring Rafts system in the Solent off the Isle of

Britain's Department of Energy believes that as much as 30,000 megawatts, equivalent to half of

Britain's current electricity consumption, could be met by such wave generators if stretched over 600 miles. But it is easy to imagine the problems of keeping the devices in place and the hazards they might

represent to shipping.
Although offshore oil technology may eventually make it possible to place such generators out at sea, most existing proposals are con-cerned essentially with coastal installations. Similar experiments are also being considered regarding harnessing the power of ocean cur-rents on the East Coast of the United States, but this would probably be even more difficult and expen-

Fascination

What has fascinated French and U.S. researchers, however, has been the possibility of extracting energy from the temperature differentials in tropical seas. With surface temperatures at about 25 degrees Celsius and waters 1,000 meters deep only 5 degrees Celsius, it should be possible to use the difference to

drive a heat engine. The French were the first to show an interest in exploiting what are called thermal ocean gradients when they set up a pilot plan off the Ivory Coast in 1951. However, the work was abandoned after independence.

American engineers suggest that plant should be installed in the Gulf of Mexico. But the small temperature differences would give such plants very low efficiencies and it is oot certain whether the idea is financially or technically feasible on a commercial scale. The government is nonetheless building a one-megawatt demon-

The ease with which wind can be

stration model.

used to provide mechanical energy for small communities has made it second only to solar power as an alternative energy source for re-mote areas, but the very output of most windmills or aerogenerators make it unlikely that wind will ever make any appreciable contribution to the world's energy needs. The advantage of wind as an en-

ergy source is that its power is forts are concentrated on finding greatest in the winter months in more reliable materials for the romuch sunshine. This is why it is seen as a compliment to solar energy. With its ability to produce electricity directly rather than through steam as in the case of solar energy, its efficiency is around 35 percent compared to 15 percent. It can be used both as a centralized source of electricity and as a decentralized

Drawbacks

But it also suffers from very serious drawbacks. It can nnly be found in certain areas, its strength is irregular and the electricity produced cannot easily be stored. Small units can provide very little electricity, while with larger ones the rotors are liable to break. Windmills are noisy, they may interfere with television reception and if used in the size or quantity required to make any significant energy contribution they would be unsightly.

But several countries are taking wind power very seriously, notably Sweden, Denmark, West Germany and the United States. Denmark has just completed a two-megawatt windmill at Tvind, the world's largest unit. The biggest previous unit was a 1.25-megawatt U.S. machine abandoned soon after it was put into operation after World war IL The United States, Sweden and

West Germany are all planning three-megawatt models. In a report published by Britain's Department of Energy it is claimed that megawatt units are now competitive with conventional power plants in mean wind speeds of over 14.5 knots. Most countries are still sticking to

the conventional horizontal Dutch windmill design. Their research efforts are concentrated on finding tor blades. Thanks to experience from the aircraft industry they are developing new materials in steel and fiberglass.

The Canadians, followed by the

Dutch, are working on a vertical windmill called the "Darrieus rotor." The advantage of this technique is that the same power can be obtained with a simpler and lighter machine, but, according to Dr. Dieter Renz of the International Energy Agency, it is not a self-starting windmill and requires high ve-

locity winds.
Wind power, like solar energy, is ideally suited to Third World countries. It offers the possibility of mechanical energy for water pumpi nr corn grinding as well as electrici-ty in areas which are not connected to a national electricity grid. Unfortunately, wind conditions are often not suitable in many developing countries that have little wind most of the year and monsoons the rest of the time.

Wood

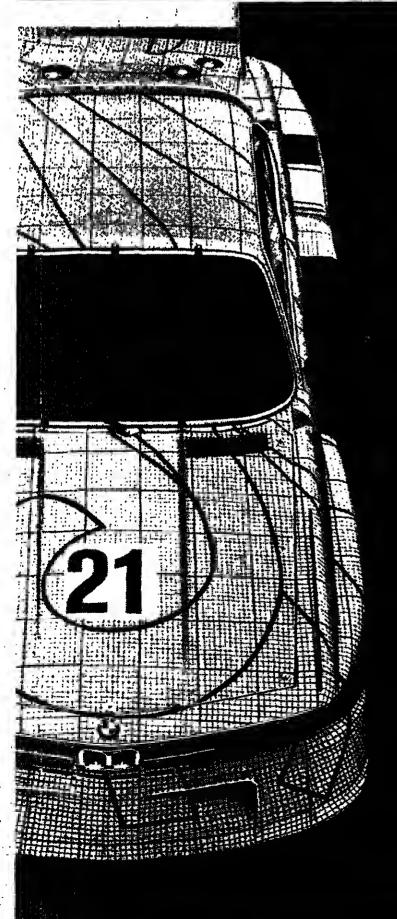
In developed countries with windy coastlines, wind power coold become a reality, but the presence of bundreds of aerogenerators is only likely to be aceptable in the most

Until the 18th century, wood or charcoal was the only heating fuel used by man. Even today most developing countries rely on wood for cooking and heating. Often the use of such fuel is not even recorded in the users themselves. But wood is only one example of how man can trap solar energy from plant life

and organic waste as a whole. The useful energy contained in wood, plants and organic waste is the result of photosynthesis. Under this biomass process, plants absorb some of the sun's energy as they build up their carbohydrates. Scientists have realized that man might do better allowing plants to collect solar energy for him rather than go to the trouble himself.

Man has merely used whatever biomass was available to him. Farmers might burn their straw, lo-cal authorities have produced gas from a town's waste products, Indian peasants burn cow dung for cooking. But with the growth of interest in new energy resources, countries like Sweden and the United States and Canada are trying to develop fast-growing trees. Brazil is producing methanol from sugar cane and manioc, and China and India are turning cow dung into gas for cooking purposes. Experiments are being carried out into growing "forests" of algae.

But the possibilities of biomass are limited. Photosynthesis is inefficient, with plants absorbing only 2 to 3 percent of the sun's energy. The space required for growing plants or trees must compete with and for food production; and harvesting is generally more trouble than it is worth. Io developing countries, where labor is cheap and there is plenty of poor-quality land available, biomass might have a role to play—but if food can be grown, it will surely be the main priority in these countries. _M.P.



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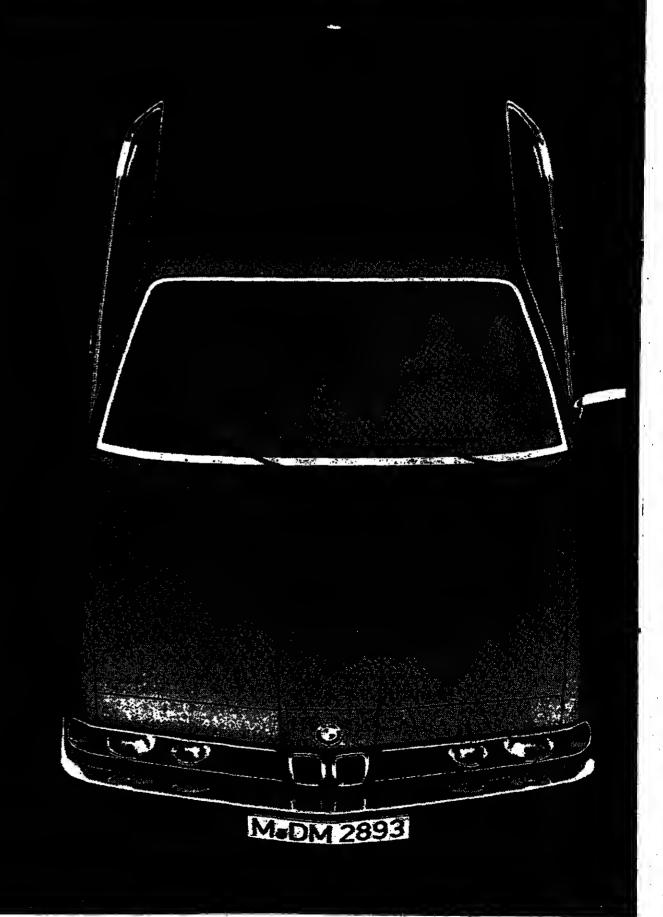
An example of the superiority which is bred by racing experience are the power units now available in the big BMW of the 7 Series. They are sophisticated enough to provide the basis for racing machines, while in production form they combine excellent power and torque with exceptional durability.

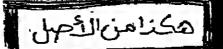
Here, as in all other details of BMW motorcars, we are concerned above all with quality - not just the minimum quality required but the best quality we can achieve. This striving for perfection is something we share with BMW drivers - like them we are only content with the best.

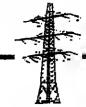
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U.S.: Search for 'Quick Fix' Like Another Moon-Shot Project

By J. P. Smith

WASHINGTON—While there are a few eddies of skeptiism remaining in Washington about the severity of the energy problem over the next decade, there is collective agreement that some-thing must be done if only because of sharply higher oil prices.

That something, inevitably, comes down to the quest for new energy technology such as cleaner burning coal processes, solar energy or simply a much more efficient aotomobile.

Not surprisingly, this push for "a technological quick fix," as one member of the Senate Energy Committee calls it, has resulted in a nearly sevenfold increase in the U.S. government-backed research U.S. government-backed research and development effort over the last four years.

Set now at \$2.7 billion, the government's energy research-and-development budget is one of the largest in the government-second only to military research efforts. Inevitably, during political frays

over solving the energy problem. people are quick to compare the energy-posed challenge to Presi-dent John F. Kennedy's charge to send a man to the moon.

One man who disagrees with an

Asked what kind of technology private industry should be in search of, Mr. Meyers says the "new technologies must be lean and simple, without sacrificing usefulness...We don't have the time to make our technologies perfect or luxurious.

Since the quadrupling of oil prices during the 1973 Arab oil embares during the 1973 Arab oil embargo, there has been a shift in the direction of the government's energy R-and-D program and its technolo-R-and-D program and its technology objectives. Nuclear energy,

tary James R. Schlesinger admit diesel-powered engine this year, that the government's role is only and Ford and Chrysler are followpart of the picture, and that the ing suit.
task of bringing new technology Utilizing urbao waste-io

nternational

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Apollo approach to developing a new generation of energy technology is Dale. D. Meyers, former head of the manned space program, now undersecretary of energy.

"The business of energy R and D is not as simple as something like putting man on the moon," Mr. Meyers said.

Into the market depends in large measure on private industry.

Because of this, they are weighing incentives such as loan guarantees, cost sharing, price guarantees or government purchases of items such as photovoltaic cells—that convert sunlight into electricity—in order to lower development costs. order to lower development costs. Aoother major factor, Mr. Schlesinger says, is the impact of government regulations on areas as diverse as building codes, tax cred-

its, or efficiency standards.

Because of mileage efficiency standards enacted into law in 1975, We only have time to make them serviceable and safe." for example, new American cars are expected to hit a 25 miles-pergallon standard by 1985.

decline, despite the fact that the towhich once dominated the funding, has now fallen off slightly. Instead, emphasis has shifted towards perfecting clean-burning coal process- ally are 10 percent more fuel effies and realizing the promise of so- cient than conventional gasolinelar energy.

Mr. Meyers and Energy Secrehas led the way by introducing a

ery, lne., estimates that op to 1 quadrillion British thermal units a amount of money that private inyear—equivalent to millions of bar-rels io oil savings—could be gener-ated by burning urban wastes in-foture." Dr. Press told an interated by burning urban wastes in-stead of liquid fuels, as well as through energy conservation resulting from recycling energy-intensive products such as aluminum.

before the energy from waste burn- propeller manufacturer.

essence, energy from garbage systems—is another promising source.

J.F. Berhneisel, head of the National Center for Resource Recovious Recoverage and Recoverage Reco Press, are anxiously watching the

viewer recently.

One example of promising R and D. spurred in large part by the higher price of aviation fuel, is an Nevertheless, it will take 10 years

lidea being pursued by Lockheed
Corp. and Hamilton Standard, a

During the 1950s, Lockheed pro-duced civilian and military versions of a four-bladed turboproppowered aircraft that was quite successful, although it was later overtaken by faster jet aircraft. Tur-boprops were put on the shelf.

Now Lockheed and Hamilton Standard, in search for an aircraft that will use less fuel, are testing a prospecove aircraft design using a small-diameter, eight-bladed pro-peller that has been wind-tungel tested at flight speeds of up to 530

Lockheed engineers and the Na-licual Aeronautics and Space Ad-mi istration say that successful development of a high-speed tur-borrop could shave up to 30 percent off the fuel demand of current high-speed jet engines.

ergy technology is the burgeoning interest in harnessing energy from the country's estimated 50,000 small-scale or so-called "low head"

Another unexpected shift in en-

Springfield, Vermont, for example. has approved a \$58-million haven't we?" he says.

electric generating plants on the town's six dams, forming a munici-pal utility that would ultimately displace the local investor-own utility,

"Small hydroelectric plants could provide up to 25 percent of New England's power to the decades ahead," says Energy Depart. ment undersecretary John F. O'Leary.

"We have come full circle

U.K.: On the Frontier of Offshore Advances

By Roy Eales

L ONDON (IHT)—Above the slopes of northern Yorkshire stands a symbol of Britain's growing preoccupation with energy. It is the experimental "aerogenerator," or, to lapse from the jargon, the windmill of landowner Sir Henry Lawson-Tancred.

Glowing reports from news-hungry energy correspondents who trudged over windy Yorkshire to witness this recent resurrection of ancient energy technology verify that the windmill should have its rightful place in the energy debate. But alas, it will be a mere dot on the nation's future energy land-

The government's energy department forecasts that £83 billion (\$158 billion) might well be spent in Britain between oow and the year 2000 for energy technology. But of that total, a mere £250 million to £500 million (\$475 millioo to \$950 million) is allowed for alternatives such as wind, sun and geothermal power.

By any standards the prospective energy technology spending sums are large. But already energy is rapidly becoming Britain's super industry. U.K. government estimates say it represents more than 16 percent of total United Kingdom capital investment. At last year's £3.6 billion rate (\$6.8 billion), it was more than twice that year's total manufacturing invest-ment io the United Kingdom, Energy employs 750,000 or 3 percent of the working population, pro-ducing a turnover of more than £13 billion (\$24.7 billion), about 5 per-

cent of the gross domestic product. So far Britain's offshore oil and gas reserves are producing most of the advances as well as consuming most of the spending on energy technology. And they will for the next 10 years, say energy experts, uotil ouclear electricity and coal developments get underway to re-

Development of 3 to 4.5 billion metric tons of oil reserves and 809 billion cubic meters of natural gas now involves spending of £2.4 billion (\$4.5 billion) a year and employs more than 100,000.

The North Sea program could cost up to £60 billion (\$114 billion), says the oil industry's II K

says the oil iodustry's U.K. Offshore Operators Association. But it will be worth every penny. It means that Britain will be self-suffi-

about 75 percent of Britain's total rest. But as oil development tails certain to go ahead after a long off in the mid-1980s, electricity will public inquiry last year. But opposers time. No other country in Europe, and few in the free world, coal 20 percent. That scenario will cover and peace organization. are so luxuriously endowed with indigenous energy.

As the world's major current development of offshore energy reserves, it is not surprising that it is also the seedbed of technological development. Oilmen like to say this development has taken them to

the froncers of oil technology.

To cope with the North Sea's violent 90-feet waves and 100-knot winds in water depths down to 600 feet, the industry has been forced to mount an array of new technology that will be good for exploiting ther offshore areas worldwide well before the North Sea has given up all its oil and gas.

The list is long-computer-con-trolled oil production from the world's biggest steel and concrete platforms to intricate techniques for sub-sea welding, pipelaying, pollution and corrosion cootrol. An unprecedented 450 miles of largediameter pipe has been laid on the seabed through which the oil is pumped ashore from 14 commercial oilfields. In addition, natural gas discoveries have forced the con-struction of a completely oew industry which is oow considering a £5 billioo (\$9.5 billion) project for the 1980s. This will mop up new and surplus gas reserves through an offshore gas gathering pipelioe oet-work which will provide oew supplies worth 35 percent of current gas consumption. Amazingly, to date there has been no major oil or

gas pollution off British shores. But the oil and gas will not last forever. State and private energy planners concur that reserves could start to decline in 15 to 20 years. To prepare for that day a vigorous de-bate is underway about how to fill the gap. Vociferous anti-nuclear en- ans have committed themselves to a vironmentalists and conservation-ists apart, the strategy most widely accepted is for a £50 billion (\$95 mixing with gasoline, are building a billion) spending program to devel-op Britain's 300-year life span coal reserves in tandem with ouclear

Unlike the oil and gas develop-ment, virtually all of this sum will come from the public purse as the coal, nuclear and electricity industries are state-owned and operated. Here's how the energy department

envisages the future energy technology breakdown:

It forecasts that total spending on energy technology will average its current £3.70 billion (\$7 billion) level to 1980, with oil and gas takouotries by 1980. ing a 65 percent sing, electricity generatioo 25 percent and coal the

condoue to the year 2000 with annual average spending building to a peak of more than £5 billion (\$9.5 billion) by then.

The non-oil and gas development is expected to be largely conventi-onal such as additions to coal production and ouclear power stations. Among the smaller options are im-proved techniques for energy conservation and wave, wind, sun and geothermal power: all of which are destined to add only marginal amounts of energy. Britain has still to decide on whether and when it will opt for development of the fast breeder nuclear reactor.

In the meantime, the most controversial energy development in Britain right now—the proposed £600 million (\$1.14 billioo) plant to reprocess ouclear fuel at Windscale, oorthwest England-looks

izations plan to wage war against the plant they fear will be the opener to n plutonium-age of bombs and radiation.

Less grand and controversial technological projects taking place now will also help fill the gap in the

For example, Britain has spent 52 years studying the feasibility of building a barrage across the River Severn estuary of western England, to generate electricity from tides. And now it might happen. The energy department reckons the barrage would cost 53.7 billion (57 billrage would cost £3,7 billion (\$7 billion) to build and produce 1 per-cent of U.K. energy demand. It will take 20 years to build if the department finally sanctions the project.

There is also development of synthetic gas from coal which io-

volves work on 16 grades of coal h the British Gas Corp. and the U.S. Continental Oil.

Then the National Coal Board is endeavoring to produce a fluidized-bed boiler that will make coal burn more cleanly and efficiently in power stations.

lo Wales, the nation's Central Electricity Generating Board is building Europe's largest pumped-storage power station using two lakes, one 1,000 feet above the other. Constant flows of the water between the lakes will ultimately provide an endless power supply-enough to meet all of Wales'

Finally, Rolls-Royce has found something else to do with the supersonic engines it built for the Concorde. By 1981 it plans to have ready a three-ton version of the Olympus 593 designed to supply the electrical needs of a mediumsized town.

And then there's the windmill

Brazil: Efforts Bearing Fruit

R IO DE JANEIRO (1HT)—Few countries in the Third World their national energy resources as Brazil. Within the last five years the exchange cost soared from \$470,000 in 1972 to \$3.8 billion in \$470,000 in 1972 to \$3.8 billion in have made such efforts to develop oil exploration program in the country's offshore, stepped up its hydroelectric investments, moved into ouclear power with the help of the West Germans and embarked on a nationwide survey of the coun-

try's mineral resources. While other countries have tended to shy away from the more unconventional technologies, the Braziligiant gasification plant around their southern coal deposits, are considering the construction of a 20,000-barrels-a-day shale oil ex-traction plant and exploring the possibilities of tapping the coun-try's limitless solar potential. Io characteristic Brazilian fashion the government is confident that with modern technology and sufficient capital the country's energy prob-

When the Arabs quintupled their oil prices five years ago, the situation did not look so promising. Although Brazil did secure 20 percent of its energy requirements from hydropower, it had become dan-

represented 46 percent of its energy demand. With 80 percent of this oil 1976. With coal only supplying 3 percent of the country's energy requirements and the role of firewood, bagasse and charcoal declining, the country's situation looked

But subsequent efforts are oow-beginning to bear fruit. The state-owned oil group Petrobras has made a series of offshore finds including the promising Campos field, which started productioo last year. The decision to invite foreign oil companies to join in this exploration effort has already been rewarded with a discovery by British Petroleum.

Progress in the coal sector has been modest with annual output still little more than three million tons, but exploration has revealed the existence of 30 billion tons of recoverable reserves in the south and 60 billion of lignite in the Amazon. The first Brazilian nuclear plant, a 626 megawatt Westinghouse model, is due to come onstream this year, but the first of eight 1,300 megawatt reactors planned under the cootroversial deal with West Germany is oot due

to come into operation before 1983.

gerously dependent on oil, which Sufficient uranium and thorium reserves have now been discovered io the country to assure national self-sufficiency, at least with fastbreeders.

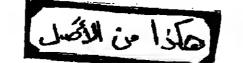
> In the hydroelectric field where Brazil has only tapped some 15 percent of its potential capacity of some 150,000 megawatts, giant projects like the Tucurui dam in the Amazon and Itaipu on the Paraguay border should bring the country's capacity to over 50,000 mega-watts in 1985, three times 1972 levels. At an electrical research center in Rio de Janeiro (CEPEL) work is being carried out on reducing transmission losses over long dis-

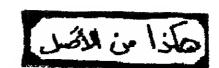
> tances. great things from its national alcohol program. With the help of some 80 projects which have now been approved, the government is aiming for a 1980 production of four ing for a 1980 production of four billion liters, more than a quarter of the country's current gasoline consumption. Most of these plants will be based on sugar cane which can produce 65 liters for every ton. but eventually distillers may turn to much as 200 liters for the same weight. Already some motor vehicles in Sao Paulo are being driven on a mixture of gasoline and this

Ruhrgas in the Internatio Energy Market Ruhrgas supplies natural gas ta a large market in the Federal Republic of Germany. A camplex pipeline system carries the gas to the custamers. Ruhrgas has cancluded a number of majar natural gas impart agreements and is currently invalved in ather natural gas impart projects. Ruhrgas is a partner af standing in . he international natural gas business. RUHRGAS AKTIENGESELLSCHAFT · ESSEN











East-West institute near Vienna

called the International institute

He said that the Soviet Union, unlike the United States, will prob-

we have many other natural resources." Western experts esti-

current Five-Year Plan will be ac-counted for by nuclear power.

Current research and develop-

ment is being concentrated on a

fusion reactor which produces elec-

tricity and also nuclear fuel for

bottlenecks that particularly affect

In the long run, however, funds required for the development of

conventional and new energy

sources-the \$250 million or more

the Nine can be removed.

conventional fission reactors. The

ergy supplies.

Soviet Union: Fuel Exports Pay for Progress

By Douglas Sutton

MOSCOW (IHT)—The subject of the Soviet Union's energy production capacities has in the past year been debated in various Western circles—with predictably various opinions.

A pessimistic outlook, such as that of the Central Intelligence Agency last year, predicts that despite its vast resources, the Soviet Union may become an importer of oil in the early 1980s. More optimistic observers believe that Soviet production of energy fuels will continue to keep pace with both its own energy needs as well as its export targets, at least through the

next decade.

Regardless of which view turns out to be correct, two things seem

at this point to be certain:

As in the past, the Soviet Union will, to a large extent, import sophisticated Western technology to supplement its energy resources.

The Soviets will continue to the based extents. use the hard currency it earns from fuel exports to the West to pay for imports of Western energy techno-

Other Sources

While the backbone of Soviet energy production will continue for some time to be oil, natural gas and coal, the Soviets are nonetheless doing serious research and develop-ment in a number of other energy areas. These include fusion reactors, solar and wind power plants, magnetohydrodynamic (MHD) cryogenie generators and

Moreover, due to the sometimes unique—and often difficult—geographic conditions of climate and distance, Soviet scientists are working on further improvements on drilling, mining and transportation

Firsthand analysis of the current state of Soviet energy production technology is rare. Few Western industry specialists are allowed to vis-it oil, gas and coal mining sites. Those who do succeed in making on-site inspections are usually representatives of Western firms hoping to sell equipment to the Soviets.

One such company representative, a sales engineer with a major U.S. oil equipment manufacturer, said, "From what I've observed, the

to 20 years behind in offshore of more than 20,000 miles from know-how."

He added: "There's no doubt that some of the purchased Western equipment is not for use in the field but rather is taken apart in some laboratory to try to copy the technology that has taken us 25 years to develop."

One reason the Soviet Union can

spend a lot for Western equipment is that it earns a lot in exports of oil and natural gas to the West. In 1976, for example, energy fuels ex-ported to the West brought in revenues of an estimated \$5 billion. That the Soviets are interested in

more Western oil and gas equip-ment, and that Western firms are more than willing to sell to the Russians, is beyond doubt. Last fall, for example, more than 130 U.S. companies—practically a "Who's Who' of the Texas, Oklahoma and California city and American California city and California California oil and gas drilling industry—staged a nine-day exhibition in Moscow in hopes of winning future multi-million dollar

Several of those companies just recently landed contracts worth more than \$20 million for drill rigs and medium-pressure sour and sweet gas well equipment, while others continue negotiations for a variety of geophysical surveying, drilling and offshore equipment-

and technology.

However, it would be misleading to say that Soviet engineers have not come up with their own developments in the oil and gas equipment field. One fairly sophisticated piece of equipment that the Soviets have developed is, for example, the

Unlike rotary drills, in which the entire pipe shafting is rotated from above ground during drilling, the turbodrill is located at the digging end. It drives only the drill bits while the piping above remains sta-

tionary.
Turbodrilling accounts for at least three-quarters of all Soviet oil and gas drilling. Engineers are working to improve the turbodrill's capabilities in heavy muds and high temperatures while also increasing the depths-beyond 15,000 feet-in which turbodrills can operate effi-

Soviet development efforts are

New technologies are being developed to try to overcome the problems posed by the great dis-tances and the severe geographic and elimactic conditions. In the experimental stage is a method for ac-celerating natural gas to speed up deliveries from Siberia to the European part of the Soviet Union. The method involves freezing and compressing natural gas into a snow-like substance just 1400 of the orig-mal mass, and then putting it into containers which can be whisked through compressurized 2-14meter wide synthetic pipelines at speeds of 150 mph.

Pipeliner

Soviet engineers have also begun using a method for anchoring pipe-lines in water-filled areas in the Tyumen Province in western Siber-ia. Instead of using heavy iron or reinforced concrete collars to hold pipelines in place, the Soviets have come up with much lighter anchors which can be shot into the ground in harpoon style.

Another new development is the inspection of oil pipelines buried in remote regions using an infrared detector—from an airplane flying at 3,500 feet. The heat-sensitive detector can locate pipelines, evaluate the heat of the crude oil inside and provide other data for repair work. While the Soviets have been im-

(Continued from Page 1)

\$200 million. Since the first agree-

ments signed at the end of 1975,

the agency now tallies nine projects

in coal, seven in energy conserva-tion, one in nuclear safety, one in

geothermal, six in solar, two in

wind, three in fusion and one in hy-drogen production. The agency has

The areas that receive the most

funds from governments are coal,

fusion, conservation and bydrogen,

with the United States, United

Kingdom, West Germany and Swe-

den among the most generous con-

no projects in the oil field.

porting Western equipment to con-duct seismographic surveys of po-

From what I've observed, the Soviets are anywhere from 10 years behind in drilling technology to 15 to 20 years behind in offshore know-how.

tential oil and gas fields, expen-mental work is also being done to develop new methods. One was reported by the Ukranian Geological Institute in L'vov, in which a laser-based method of using holograms was being tested to convert conventional seismic data into graphic form. If the technique proves suc-cessful, it could facilitate the work

of some 40 computer centers now being used to analyze seismic data. Despite the fact that the Soviet Union, particularly in various regions in Siberia, possesses huge oil and natural gas resources. Soviet planners have to consider the country's long-term energy needs and are busy looking into and developing other sources of energy.

One Soviet scientist, Yuri D. Konopov, said that "the share of nuclear energy will increase over the long-term, while hydroelectric power output should hold its pres-ent share, increasing at about the same rate as overall energy output

Mr. Kononov is currently at an work is going on at the Kurchatov

Participation

Given the choice, most govern-

ments prefer to carry out research

on a national rather than an inter-

Consumer Countries Pool Research

cooperation between the United search activities otherwise not States and West Germany in the available to them. gasification of coal, the decision to Under the IEA, governments or

build two 500-kilowatt solar-companies may acquire know-how powered plants in Spain, the costly and preferential royalty treatment

fusion research being carried out in the United States and West Germany and plans to manufacture hydrogen with the waste heat of nuclear reactors at Ispra.

and preferentian royalty treatment to techniques being developed in on techniques being developed in other countries.

At the EEC the research efforts of community companies can be encouraged and the technological better the treatment of the countries of th

experimental fusion device in which a power output from plasma confined in a magnetic field has reached 450,000-600,000 amperes for about a haif second.

Institute with the Tokamak-10, an

Together with the Electric Power Research Institute of Palo Alto. Calif., the Kurchatov Institute will begin work in the early 1980s with a Tokamak-20 test reactor. It will contain deuterium-tritium plasma at 50 million degrees Celsius for more than one second, according to Eastwes! Markets, a Chase Manhattan Bank publication on East-West trade.

for Applied Systems Analysis (IIASA). With other scientists, he is working on what he calls "impact models"—computer studies of the The newsletter said that U.S. scipotential impact on national econoentists are interested in the Tokamies of investment of materials and manpower in developing future enmak-20 because it could offer a possible alternative to fast-breeder

MHD

ably not go into large-scale devel-opment of solar power, "due to our geographic position and because mate that as much as one-fifth of all new installed generating capaci-ty in the Soviet Union during the

Testing is scheduled to begin this year at the Sovie; High Tempera-ture Insulate near Moscow with a 4-Tesla superconducting magnet delivered last summer by the Ar-gonne National Laboratory in Illinots. The 60-ton magnet will be used in experiments with a Soviet-built natural gas-powered 300-megawatt MHD pilot plant.

tests at an end MHD research facility to be built in Montana.

Also in the field of generators Soviet scientists have been experi-menting with a super-cold cryogengenerator at the Research Institute for Electrical Equipment in Leningrad. The generator's rotor is a cryostat made of niobium titanium alloy that is continuously fed by liquid helium which keeps tem-peratures at near absolute zero, thus providing high conductivity and fuel conversion efficiency. The generator has an output of 1,000 kilowatts, but Soviet scientists bein the lieve that the cryogenic technology can lead to generators producing 2,500-3,000 megawatts or more, with at least 90-percent efficiency.

Another joint U.S.-Sawiet project is in the development of magneto-hydrodynamic (MHD) power generators. They may be able to convert fuel into electric power as 50percent efficiency, compared to the 20-40-percent efficiency of conven-

Under a reciprocal arrangement, the Soviets will later take part in

requirements and backed up by a full-load test bed for main coolant pumps up to 13 MW dave Klein, Schanzlin & Becker **KSB** pumps

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require pumps which vary widely in design,

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pump for a discharge pressure of 40 bar.

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KSB provide reliable pump fechnology for all

the technology to meet the most stringent

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stations with a variety of reactor systems.

The lechnical quality level and inhability of nor

nuclear and fossil friel power stations at present

experience, intensive research and development

In 1905, KSB developed a mag section boild fred

construction and size.

extensive quality control

European research reactors

power station evoles.

programme for all applications.

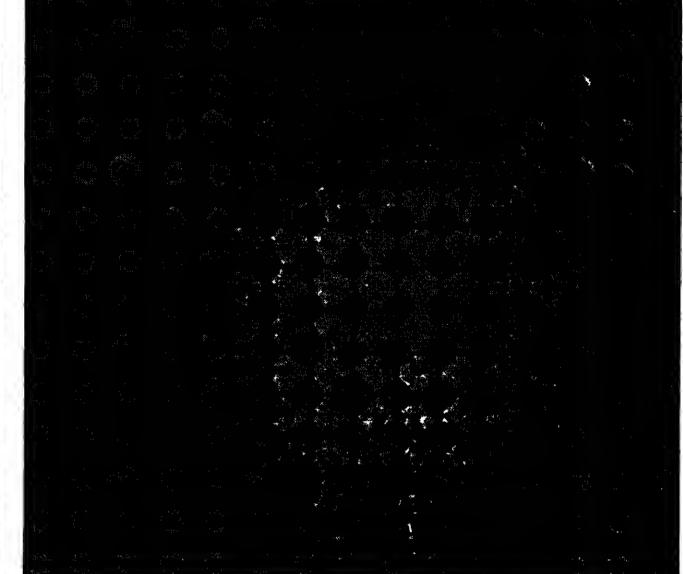
conversion processes in thermal power stations



Natural Uranium Milling Mining Exploration

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Raw Materials Energy Environment

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The Supply of Raw Matenals The Production of Energy The Protection of the Environment The Priorities of Our Age

METALLGESELLSCHAFT AG Reuterweg 14 D-6000 Frankfurt am Main

The Priorities of Metaligesellschaft



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West Germany: Resource Poor, But a Leader in Technology

By Thomas C. Lucey

RANKFURT (IHT)- While West Germany may be poor in all its energy resources except coal, it is rich in energy technology. This includes technology for fossil fuels and ouclear energy as well as for fuels whose time has not yet

Laser enrichment, a shortcut to highly enriched uranium, is being intensely researched in the United States, France, Great Britain and Israel German work in this area started in 1971, with basic research at the Battelle Institute in Frankfurt. Uranit, Juelich, a company in uranium isotope separation, has supported this work with govern-ment funds and, since 1973, bas given contracts to more research

Uranit, which is owned by companies belonging to two giants in the German energy field, VEBA and Rheinisch-Westfaelisches Elektrizitaetswerk (RWE), is a member of Urenco/Entec, a German, Brit-ish and Dutch joint effort to collaborate in uranium enrichment by gas centrifuge.
Last month, Uranit announced

its selection of Gronau, oear the Dutch border, as the site for a 1billion-deutch-mark (now worth \$500 million) gas centrifuge urani-um enrichment plant. The Gronau plant is expected to be ready in the early 1980s, supplying enriched uranium to about eight ouclear plants of the Biblis type.

Kraftwerk Union (KWU), wholly owned by Siemens and probably this country's internationally best-known builder of nuclear plants attention. In 1975, the government (including the 2,500-megawatt one decided that nuclear energy should at Biblis, south of Frankfurt), is supply 60 million tons of oil equivalso said to be engaged in research alent (MTOE) out of a total estimates on laser enrichment.

1,000 Degrees

The German subsidiary of the Swiss company, Brown, Boveri and among its products essential comhigh-temperature reactors.

At the Nuclear Research Facility

io Juelich, the company conducts ty in finding sites, often due to lo-high-temperature helium tests of up cal grass-roots opposition. to 1,000 degrees Celsius, with a tur-

with Lurgi, although the Frankfurt-based company has competition from a Krupp subsidiary and other ter, would seem to cootradict them. companies as well as from expected However, Paul Mentre, the

States and secondarily in Europe, demand-implicitly meeting ecoloas the availability of oatural gas gists' criticisms that previous fore-

Low-priced crude oil and rising coal prices in the 1960s caused most plants using the Lurgi process 160 percent since 1973) mean "we

of their energy supply, Mr. Natus increased and other financial mea-explained. And in places like Aussures taken to reduce the EDF's in-

raised by loog tanker routes from the sources, coal gas is even more than air in the gasifier.)

(BTUI because of the use of oxygen a new technology to use alternate into alternative fuels for many years. It has found that "hydrogen than air in the gasifier.)

Lurgi has expanded the range of coal sizes, from a spectrum of 6 to 20 mm to 2 to 30 mm and it can use caking coal. During World War II, Lurgi was able to produce 5 million tons of fuel from lignate. (The first work on the process began in 1930.)

Gasifier

The latest model gasifier is the Mark IV, named after its fourmeter diameter. By comparison, gasifiers built by Lurgi in South Africa 20 years ago had a diameter of 3.7 meters, only slightly narrower. In connection with a Japanese (In the gasifier, the solid fuel is put company, DEMAG is supplying a under pressure of 145 to 435 re-injection process for Kuwait so pounds per square inch, using an that the propane gas that is forced oxygen-steam mixture. The clean to the surface by the rising oil is gas that emerges from the process pumped back to bring more oil to has a high calorific value of about the surface.

Despite its loog history and wide use, the process does not yet pay its own way. "We are still putting in more than we take out," says Mr.

In the field of gas produced in oil drilling, projects include a plat-form-top power plant in the North Sea, planned by Nordwestdeutsche Kraft (NWK), Hamburg, to utilize the gas that has up to oow been lost. NWK expects to produce 350 to 400 megawatts with gas turbines and bas financial support from the European Economic Community In connection with a Japanese

Germany is also active in seeking

gram, 45 vehicles—among them the spark-ignition engines and the hyW Golf, VW bus and Audi 100—
were driven around Germany on a great problems and because pollumixture of 15 percent methanol tant emission of bydrogen engines and 85 percent regular gasoline. In is particularly low.'
March and February, 1976, the test
The company is March and reorday, 1770, and the company is considered with a fleet drove with pure methanol and bus built on a van chassis with a the methanol-gas mixture in the Arcóc Circle

Pure Methanol

Using pure methanol on a regular basis is the company's goal, and this project is now said to be in its

last step.

VW is also interested in using another alcohol as car fuel-ethanol. It can be made from a number of organie substances, including vege-

Daimler-Benz (Mercedes) has Last year, Motoren-Werke been conducting extensive research Mannheim (MWM), an outgrowth

The "fuel of the future" at Volks-wagen is methanol. In a test pro-bilities since the combination of

The company is testing a mini-60-horsepower engine. On a full tank it can go for about 120 miles. Efforts are being made to double this distance.

Mercedes would like to be able public transportation authorities.

"The further development of bydrogen technology could bring about the eventual changeover from crude oil to bydrogen," the

Odenwald area. The diesel-comoresser set extracts heat from the environment as well as from the engine itself, the gas exhaust and the tures.) radiated heat.

MWM says this method utilizes the hotel's waste water and used air and reduce the amount of oil needed to heat the hotel by 75 percent. The hotel will use an electricthermal pumb, to produce a maximum heating requirement of 1.7 million kilocaleries.

Hot-Dry Rocks

What is believed to be the first attempt in Europe to use the hotdry-rock process to tap energy is being made in Urach, south of

of the stationary-engines department of auto inventor Carl Benz's company, turned out its first diesel engine for a thermal pump, to be installed in a 44-bed hotel in the Companyld area. The directions for local heaving (Experiments in for local heating. (Experiments in Los Alamos, Calif., failed to find water at sufficiently high tempera-

> The hot-dry-rock process involves injecting water into a widely extended system of small fissures in plutonic rock. The hot rocks heat the water, which is then brought to the surface through a second drill hole. To make the project pay, the heat must be able to be distributed as evenly as possible over several square miles.

The oil crisis caused the West German Ministry for Research and Technology to announce that it considered "the permanent primary energies of the sun and wind as having great importance" and to finance about 50 research and de-

velopment projects in the following years. The German Society for Sun years. The German Society for Sun Energy in Munich reports about 5,000 sun-energy facilities were built in this country by the end of last year—collecting a total of 30 to 35 megawatts, an increase of 20 times those available in 1976. For this year, according to the society. the total could reach 10,000 or 15.000.

Most of the facibities in use are for heating water, buildings and swimming pools,

At a conference of the Solar Energy Working Group (ASE) in Essen last year, information was ex-changed on projects in this field undertaken or backed by some of the best-known companies in this country—Dornier, Hoechst, AEG-Telefunken, MAN (Maschinenfa-brik-Augsburg-Nuremberg), Phihips, Brown, Boveri & Cie., Messer-

France: Looking From Nuclear to Other Potential Sources

By Vanya Walker-Leigh PARIS (IHT)—Following the 1974 decision to sharply reduce its 75 percent dependence on imported energy supplies, especialoil, France committed itself to Western Europe's most ambitious

nuclear program. But with the delays in ouclear construction schedules, other enermated consumption for 1985 of 240 MTOE-involving a ten-fold increase in nuclear capacity.

A 13-MTOE shortfall is oow officially foreseen for nuclear electricity in that year. Delays in finish-Cie, which supplied what it called ing Westinghouse-licenced Pres-the world's biggest transformer for the D.C. Cook 2 nuclear plant in the United States, includes being ordered at the rate of 5,000 megawatts a year—are attributed megawatts a year-are attributed among its products essential com-ponents for technical security in high-temporary resetters. the need to incorporate increasing security features and some difficul-

But while there have been rubomachine equivalent in size to a 300-megawatt helium turbine. The Brown, Boveri laboratory there tests the behavior of materials under permanent high temperatures.

Coal gasification is synooymous the French Commissariat a l'Energie Atomique (CEA). Aodre

energy, states that the imminent re-"The market is developing for port of a long-term forecasting coal gas," said Dietrich Natus of group may come up with lowered Lurgi, "primarily in the United estimates of future electricity casts were not based oo real needs.

Also, be adds that increasing costs of nuclear construction (up may be more cautious in subsitutlodustry will be willing to pay ing nuclear for fuel-based stations the higher price for coal gas rather than risk interruptions or rationing says, will have to be considerably explained. And in places like Aussures taken to reduce the EDF's intralia, where crude oil prices are creasing debt burden (now 31.4 bilties Solar Energy Commissariat this

Slammed

The 10-billion-franc-a-year cost of France's nuclear program bas been privately criticized by Finance Ministry officials and publicly slammed by the National Assem-bly's Finance Commission. There is also criticism that nuclear gets 1.8 billion francs from the government's total energy research-anddevelopment budget of 2.3 billion

Other problems also loom over France's nuclear plans.

The outlook for long-term uranium supplies is precarious, according to a statement reportedly made by the foreign minister to last December's meeting of the Council on Foreign Nuclear Policy. By 1985, he is said to have warned, France will only produce 20 percent of its uranium needs (compared to 50 percent today) while Canada, the United States and Australia could well put tough conditions on future deliveries-in the context of the world uranium shortage forecast by OECD by thenand efforts to buy large quantities from South Africa would spark major problems with Niger and Gabon, where French state and private interests control uranium

According to Mr. Mentre, more aid can also be expected for the 500-million franc research program on deep-sea drilling run by the processes being developed by Texa- government's delegate-general for French Petroleum Institute and the two state-owned companies. A fiveyear research program on enhanced recovery techniques, costing 1.5 billion francs, will soon be launched,

> With domestic gas production at Lacq (7 MTOE) declining from 1982, French imports of natural gas will cootinue to increase strongly under contracts coucluded with Algeria, Iran, the Soviet Union, Norway, the Netherlands and, in prospect, with Nigeria.

Solar

lion francs, of which 14 billion francs are in Euroloans).

Slormmed spring, solar energy will be strongly being built in Sicily. Mr. Mentre foresees a possible breakthrough doubts that it can meet more than 5 that could reduce production costs

also the major oil firms are working oo solar-energy technology, together with a group of France's leading industrial firms. Two small solar with Third-World countries will power stacons are being built at also be extended. present, with a French consortium Geothermal energy will be pro-participating in a European plant moted by the oewly established

percent of French energy needs by of photovoltaic cells in a few years the year 2000.

Not only EDF and CEA, but in output of solar heaters, captors and bring about a marked increase

France's well-developed oetwork

public company. Geochale, aimed at equipping some 300,000 to 500,000 homes by 1985, though its contribution to energy needs is seen as marginal.

The New Energies Delegation, overseeing solar and geothermal ac-tivities since 1975, sees little prospect for developing wind and wave power io France

Energy conservation is expected

to play an increasing role, however. Of the 13 MTOE "saved" in 1977, 10 million of these were saved by private householders. To meet 1985 energy-conservation targets, annual investments must run at 5 billion francs a year, compared to 2 billion in 1977, says the head of France's Energy Conservation Agency, Jean Syrota. Although the agency has promoted legisladon on subsidies and incentives, funded over 130 demonstration projects and con-

cluded 40 energy-saving agree-ments with industrial federations, Mr. Syrota sees the need for new financial mechanisms that would encourage industry to invest in energy-conservation technologies. The agency is credited with persuading the government to halt the spread of all-electric homes pro-moted by EDF. But Mr. Syrota warns that a major rethinking of energy uses and of real energy

Chinese Export Petroleum for Foreign Exchange

TOKYO (IHT)—If at the turn of harbors. The target for their com-the century oil for the lamps pletion is 1985. of China helped fatten the coffers For their realization. China will of Standard Oil, today it is Chinese petroleum exports that have become a key source of foreign ex-haoge for the new Peking leadership in a bid to realize its grandiose plan to create a "modern nation" by the year 2000.

Heading this top-ranking organ, named the State Economic Commission, is Kang Shih-en, formerly minister of petroleum and chemical

rate Ministry of Petroleum Indus-tries headed by Sung Chen-ming, puts China's recoverable oo-shore formerly chief administrator at the oil reserves at 45 billion barrels

For their realization, China will

For this purpose, a fuel-and-power directorate has been set up in Peking's State Council to build China into a strong power through the use of its oil and coal resources, both for domestic use and for

taches to its oil resources is further oeck with the Soviet Union. reflected in the creation of a sepapioneering oil field in Taching in with additional offshore reserves at the northern Heilungkiang prov- an estimated 30 to 110 billion bar-

mer deputies, will be in charge of developing and exploiting 10 oil and gas fields that are part of 120 large-scale projects designed to fuel China's new industrial "great leap

These projects, disclosed by Sinkiang province in the west to Communist party Chairman Hua Pohai Bay in the east and from Kuo-feng in a 3-and-1/2-hour report Healungkiang province in the north Kuo-feng in a 3-and-1/2-hour report Heilungkiang province in the north to the National People's Congress to the South China Sea. held in February, include 10 iron Kang Shih-en, the newly ap-and steel complexes, 30 power sta-tions, six trunk railways and five nounced his objective to catch up Mitsui Engineering and Shipbuild-

have to earn foreign exhange to pay for the imported plants and the technologies it needs. Oil and coal exports are seen as figuring prominently in meeting this requirment.

Guesses

Foreign estimates of China's recoverable fossil-fuel reserves are at best educated guesses. As for oil. estimates range from the 77-to-90billioo-barrel appraisal of the Japan External Trade Organization to an estimated 39 billion barrels made by the U.S. Central Intelligence Agency, to 20 billion barrels according to the American Petroleum Institute. With 20 billion bardustries.

rels China's oil deposits would be 9th in the world, while with 39 billion barrels it would be neck and

An independent American ex-

On the other hand, Chinese Vice-Mr. Sung, one of Mr. Kang's for-premier Teng Hsiao-ping said last er deputies, will be in charge of September that the amount of his country's oil reserves was estimated at 400 billion barrels. Chinese sources have claimed that prospecting has confirmed that petroleum deposits have been located from

with and overtake the United ing Co. for two marine geophysical basins that are promising sources

China's oil output in 1975 reportedly amounted to 562 million barrels. Peking's official New Chion News Agency recently claimed that in the first 11 months of 1977. crude-oil production increased 3 percent and natural-gas output rose 22.3 percent when compared to the corresponding period in 1976. But the news agency failed to disclose production figures.

Knowledgeable sources in Tokyo put China's oil production in 1977 at 1.8 million barrels a day, thus edging ahead of Indonesia. According to U.S. intelligence, more than half of this output came from the ern Manehuria, which is surrounded on three sides by Soviet territory. One-tenth of total production is now believed to be exported.

China's objective is said to be to achieve a production of 8 million barrels a day by 1990.

Io order for China to exploit new fields and increase output, specialized pipeline equipment is needed along with sophisticated drilling machinery and the various products occessary to assure the safety of producing wells both on-shore and offshore.

The nation is believed to have rchased some \$50 million worth of such equipment from the United States, Japan and Romania in the secood half of 1977. It has recently

States in oil exploration. He survey ships, with a displacement claimed that in 20 years of oil prospecting and exploration, China has about \$16 million, The vessels will tapped less than one-tenth of the be equipped with magnetometers to detect oil, gas and other offshore resources. These purchases are estimated to

> spent since 1972 for this type of equipment. At present, offshore exploration is limited to the Gulf of Po Hai, Hainan Island and undisputed

> have brought the amount to more

than \$360 million that Peking has

coastal areas. Preliminary seismic surveys have also taken place over a wide area, including the disputed Spratly and Paracel island groups. Taiwan, Vietnam and the Philippines, as well as Chioa, have all laid claims to these archipelagos.

cilities for refining.

The Japanese Energy Agency es-timates China's coal reserves at 100 billion tons with its coal production in 1975 at 470 million tons.

Plans for the mechanization of China's coal mines by 1978, at a cost of \$300 million in mining equipment, have been announced. There are an estimated 125 coal mines now being exploited—but much of the coal extracted, being surface coal, is reported to be of

poor quality.

Recent Peking broadcasts have claimed that production at the Kailan coal mines has been restored to a 70,000-ton-per-day level. This mining complex was devastated by the violent earth-

quake of July 28, 1976 that flat-tened the adjoining industrial cen-ter of Tongshan, with a reported loss of 200,000 lives. With the explosions of its own

atomic and hydrogen bombs, China is known to have the technology and know-how occessary to develop nuclear-power plants. But if any of them are planned, under construction or in operation, the fact remains shrouded in silence. On Jan. 22, Yuan Pao-hua, who

was then vice-minister for the State Planning Commission, stated that China would develop its oil, coal, peat, lignite, bituminous shale and geothermal resources, but made no mention of nuclear power.

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Following up on its trade agreement with the European Economic Community, Peking signed an eight-year pact with Japan in February and the Peking State of the Peking S ruary designed to solit \$20 billion According to Japanese industry equally in two-way trade. Under paraftin content, has the disadvan- more than double the imports of tage of requiring heavy cracking fa- Chinese crude from 7 million metrie tons in 1978 to 15 million

metric tons in 1982. Japanese purchases of Chinese coal during the five years will range from 5.1 to 5.3 million tons of cokiog coal for steelmaking, and from 3.3 to 3.9 million tons of steaming

coal for power generation. In exchange, China will buy from Japan industrial plants and

technology.

China is also selling oil to That-

land and the Philippines. Little information is available on China's capacity to generate elec-tric power, which Peking seems to regard as being of strategic military importance. However, current reports are that thermal power plants are being gradually converted from coal to oil.

RY.H.

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in our products from ebroed,

One of the firet questions that ceme

"What do you do in e cloudy country with only e limited emount of sunshine?" It sounds almost impossible. but we went on to develop a solar heet collector, cepsbie of ebsorbing eolsr energy, right through the clouds themselves. And in thirty five countries in all five continente, we've proved that it works. Miromit eolar heeting systems ere suiteble for privete homes. They elso provide hot weter for complete

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Hello, managers



If industrial plants — especially in the young industrial nations — are to be real economic assets, a transfer of know-how on a wide scale is essential. For without the well-founded skill and knowledge of man, the most sophisticated machines and the most imposing plant will grind to a standstill.

The DIAG - concept of plant installation

Deutsche Industrieanlagen GmbH, Berlin, known all over the world as DIAG, has been one of the great names in the international plant business for over 70 years. The secret of DIAG's success is simple: Insistence on the transfer of know-how as a crucial element of successful industrialization. Based on the vast experience amassed in its own engineering production workshops, DIAG has developed a concept which makes possible the great stride from the turnkey factory to the industrial plant in full production. We have built factories in many countries on the basis of this concept - production units for machine tools, bicycles, mopeds, tractors, crawler vehicles, diesel engines, agricultural machinery, electrical household appliances, filament lamps, batteries and generators. In each individual case, the following prime requirements were given special consideration:

Adaptation to the facilities and necessities of

the client country.

Adoption of new technologies developed during the installation of the plant.

Training of indigenous labour to the status of skilled workmen and technicians and

Responsibility for organization and management during the working-up phase.



Keys to success

If a plant supplier is to be successful on an international level, he must fulfilsome key conditions:

He must have wide experience in foreign countries, be familiar with the mentality and level of education in the client country and scrupulously observe its laws. He must adapt easily to climatic

Know-now uansfer in the international plant business

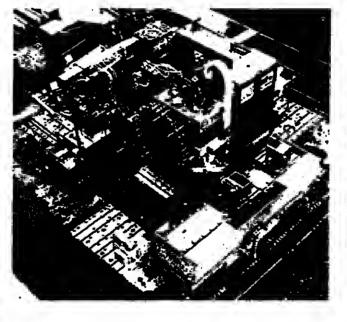
and geographical conditions. All this is purely a matter of hard-won experience. DIAG experts built their first factory in China more than 70 years ago; they have been working for 50 years in Iran, 25 years in Burma and now over 10 years in Algeria. DIAG's turnover in the plant business is fast approaching the DM billion mark.

The manufacture of products with high market expectations necessitates in many cases the procurement of a manufacturing licence. But it is not every big-name licence-holder who is prepared to disclose the secrets of his manufacturing know-how. Unless, that is, the applicant has his respect and confidence...



To have his own know-how is a valuable additional asset for the plant supplier. One who has installed and organized his own manufacturing plant has a decisive advantage over other plant suppliers: The fund of expert knowledge necessary to keep a production plant functioning at top efficiency. DIAG has its own works in Germany: Fritz Werner in Berlin, Hermann Kolb in Cologne and Gebr. Honsberg in Remscheid, These DIAG works manufacture some of the world's finest machine tools, from simple milling machines to articulated transfer lines.

And machine tools are the basis and the indispensable component of most industrial projects.



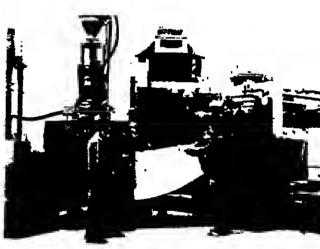
6000 trainees from 40 countries

No machine can function without people to operate it. This is one reason why DIAG has attached the greatest importance to personnel training from the earliest days. In DIAG's own training centres in Germany or in the client country, in apprentice workshops, industrial schools or technical colleges, young persons from all parts of the world are being prepared for their future vocations under the guidance of DIAG's expert technicians and instructors. Up to now, more than 6000 trainees from over 40 countries have passed through our hands.

Large-scale industrial projects call for a team of experts to take charge, from the first consultations with the client to the final transfer of the plant in full production. Of DIAG's staff of

plant in full production. Of DIAG's staff of some 6000, about 2000 are technical experts occupied in the plant business.

The development of Europe's industry occupied a period of many decades. The know-how of the experienced plant supplier now makes it possible to condense this historic process into the space of a few years. As a result of its work on hundreds of projects in many various branches of industry, DIAG has gathered a vast fund of well-founded experience, which makes it a first-choice partner when it comes to the installation of industrial plants.



Symbol for the future

Four children from four continents symbolize the future of the young industrial nations. In a series of informational advertisements in international periodicals, DIAG is drawing attention to the importance of the education of these children, the future managers, engineers and teachers of their countries. For successful industrialization is made possible only through the transfer of technical and organizational know-how.

That is the central pillar of the DIAG philosophy: DIAG offers knowledge now.



If you would like to know more about this subject, please write to us.

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Israel, Dependent on Oil Imports, Looks to Solar Research

By Yuval Elizur

TERUSALEM (IHT)-With more than a quarter of a million Israeli families already dependent on solar heaters to produce hot water for hausehold use. Israeli scientists are hoping to exploit energy gener-ated by solar ponds for industrial use and for heating greenhouses. Even now, at Tel Aviv University researchers are driving in electric cars powered by solar energy.

However, Israeli policymakers are concerned over the fact that, despite progress made here and elsewhere in the use of alternative sources of energy, Israel is still almost totally dependent on imported oil. The nation spends close to \$700 million on oil each year. Of even greater concern is the problem of the fuel's availability. At present, Israel is dependent on several sources of oil, the most important one being in the Gulf. There is some worry here over whether all these sources will continue to supply Israel in case of an emergency

or outbreak of war. Thus, the main principle stated in the first outline of its energy pol-icy recently drafted by the Ministry of Energy is diversification. Israel's prinrities are to diversify sources of oil and other sources of energy and to concentrate on the development of new technologies. The decisionmaking process, the policy outline emphasizes, should take into consideration geopolitical, economic, technological, logistic and social aspects. Its main goal is to supply Israel's energy needs in the time, place, quantity and the form most

Special attention will be given, the energy-policy paper adds, to securing the supply of energy in times of emergency. These energy goals will be coordinated with other national goals.

Alma Field

started regular oil production from the Alma oil field in the Gulf of few months production at Alma population live, have access to electivity.

day. By 1979 this local production India's major energy sources are Israel's oil consumption, which is cording to a report made by the expected to exceed 7.3 million tons nation's Fuel Policy Committee, toin the current year.

Israel has already agreed to return to Egypt in any peace agreement between the two countries.

tsrael is hoping to reduce its dependence on imported oil by increasing investments in oil exploration in various parts of Israel and by building power plants fueled by coal and nuclear power.

A plant that will be fueled by coal is presently under construction near Hadera along Israel's Mediterranean coast between Haifa and Tel Aviv. Completion is expected by 1984. The plans will supply about 1400 megawatts, about 40 percent of Israel's estimated consumption of electricity at that time.

Relatively mild protests of local residents and environmentalists against the construction of the plant on this spot have long since been overcome, but it is still not clear how the one million tons of coal a year that will be required for the project will be supplied to the station. Israel has no coal of its own and environmentalists are vigorously opposed to the plan to build a special port at Hadera, where the imported coal will be

Even more in doubt are the plans conmental reasons.



Technician checks solar energy receptor and reflector in Israel.

landed. Earlier plans to transport station on the Mediterranean coast the coal by train from Haifa Port, at Zikim, 40 miles south of Tel 25 miles away, were shelved for Aviv. Here the plan to build a 900 megawatt plant has been questioned for economic as well as envi-

large stockpiles of oil. In 1976 the appointing. U.S. government granted Israel a Efforts are continuing to solve \$50-million loan for the construction the technical problems involved. ioned for economic as well as envi-commental reasons.

S50-million loan for the construc-tion of underground storage facili-Because of the vulnerability of ties. However, they have not yet cating considerable sums from its

The two large oil refineries at Haifa and Ashdod, about 25 miles south of Tel Aviv on the Mediter-

Israel's energy economy to political been fully utilized since some of the pressures, it was decided to create geological surveys have proved dis-

storage and transportation facili-

ranean coast, are already connected by pipelines to the major consump-tion centers in the country. In view of these limitations on

efforts to diversify existing sources of energy, an increasing amount of attention is now being given to the development of alternative sources of energy. Among the plans is a project to build a canal from the Mediterranean to the Dead Sea, which is 1,200 feet below sea level,

the lowest point on earth.

The canal would have a double purpose. The would be to save the Dead Sea, which at present receives water only from the Jordan River that flows from the north. In recent years the Jordan River has been dechaing rapidly because of evapora-tion. The second would be to utilize the downward flow of the water for the production of hydroelectric

Estimates

It is estimated that the Mediterranean-Dead Sea canal could generate an average of 100 megawatts, with power production increasing to 400 megawatts in peak periods at the time when the Dead Sea will be restored to its former level.

Initial estimates of investment in the project call for an outlay of half a billion dollars. A steering com-mittee, composed of 45 top Israeli experts, is studying the reasibility of the project as well as various en-

gineering alternatives.

Fifteen years ago Israel was considered one of the pioneers in research on the use of solar energy.

An Israeli invention led to the improvement of solar heaters that provide warm water for home use. In solar ponds, developed in Israel, water can be brought to boiling level and used for generating electricity. An Israeli electronics company, Tadiran Ltd., with the aid of a government grant is at present experimenting on total climate control, which would provide air-conditioning in the summer and heating in the winter from solar energy.

A new hospital now under construction in Jerusalem is installing ruge solar heaters that will provide it with total climate control.

However, Israeli experts admit that a budget squeeze in the years that preceded the energy crisis in 1973 brought a slowdown in solar-energy research, which may have cost Israel its lead position in the field. In recent years major efforts have been made to close the gap.

In 1978 Israel will spend up to \$12 million, or about 14 percent of all budgets allotted for industrial R and D, on research in energy technology.

Other Projects

A considerable proportion of the budgets, 60 percent of which come from government sources, will be invested in projects involving solar energy. However, there are other research projects, including the utilization of Israel's peat and oilshale deposits and the conversion of agricultural waste to methane gas, as well as a series of industrial rojects such as water desalination using a combined system of solar

and gravitational energies. Israel has also recently introduced a systematic program for energy conservation. It is believed that a series of increases in the price of oil, and especially the lifting of subsidies on the price of heavy fuel oil for industry, will induce Israeli consumers to do more

While it is not expected that these projects will actually bring a cut in Israel's oil consumption in the next few years, it is hoped that imports will remain almost at their present level, at least for the near

India Pins Its Future on Biogas and Solar Electricity

in its energy situation as India. One of the first countries to enter the nuclear field, it still relies on vegatable waste products, firewood, cow dung and wind power for nearly half its energy consumption.

Despite the fact that India is the world's tenth most industrial On March 27 of this year, Israel nation, its average per-capita energy consumption is only 3 percent of that of the United States. Only one-Suez off the coast of occupied third of India's villages, where Sinai. It is expected that within a three-quarters of the 600 million

cover a sizable proportion of coal and hydroelectric power. Actal gross coal reserves are 83 billion one. However, the Alma oil field in tons, of which some 29 billion are

TEW DELHI (IHT)-No countial is 41,000 megawatts on the bameaningless to the average Indian

Bombay will increase the country's annual oil production potential to at least 20 million tons by the early 1980s-more than half the country's anticipated consumption at that time. Further discoveries may lead to self-sufficiency in the oil sector, even if it is short-lived.

The country's uranium reserves cannot support much more than 10,000 megawatts of nuclear capacity, hut with plutonium fast breeders this could be increased 60 times. With the world's largest reserves of thorium at 45,000 tons, India could gain 200 times more with the thorium cycle than with the plutonium

What appears as an impressive

try offers quite such contrasts sis of only 60-percent load capaci- who is lucky to earn 20 cents a day if he is in the monetary system at Recent offshore discoveries near all. Experts say the needs are not ombay will increase the country's costly centralized systems such as electricity grids or natural gas supplies, but the availability of cheap new energy installations.

> After 25 years of Soviet-style development based on heavy industry, India's new government is shifting the emphasis of economic policy to developing industry and agriculture at the village level. Such a policy can be achieved only through the development of new energy sources such as solar power

So the country has produced the strange contrast of developing a prototype fast-breeder reactor at prototype fast-breeder reactor at velopment of fast-growing trees for the same time as it is turning out future firewood, the conversion of Sinai is included in the area that proven, while hydroelectric poten- battery of energy inputs becomes cheap biogas plants that can con- cow dung into methane and fertiliz-

vert cow dung into methane gas for ers with biogas units, the produccooking and lighting. Scientists in India are working

on the most sophisticated tech-niques in energy. In the coal field, Bharat Heavy Electricals is developing combustion-bed boilers at Tiruchirapalli and Hardwar. It is also designing a small low-value coal-gas plant and exploring the possibilities of magnetohydrodynamic (MHD) power generation. In electricity they are experiment-ing with new turbines.

Villagers

At the same time, the Indians are looking to the needs of those villagers who do not know what electric ty is. Research is going into the de-

tion of smokeless coal as a cooking fuel and the ntilization of solar energy for cooking crop drying, wa-ter heating, refrigeration, water pumping and electricity generation.

A whole range of solar cookers has been developed at the Central Arid Zone Research Institute at Jodpur, with the cheapest unit costing only \$10. A 10-ton-per-day pad-dy drier has been developed by the National Indian Development and Village Industries are building Corp. in Ludniana, while the Indian Institute of Technology is developing a refrigeration unit for agricultural products.

A hotel in New Delhi heats its Indians believe it is through the swimming pool with solar energy, a 10-kilowatt solar-power plant is generator that economic developbeing built in Madras in an Indo-

tronics is about to bring out India's

first photovoltaic panels.
The National Physical Laboratory in New Delhi is even working on a turbine driven by solar energy apors.

However, the symbol of India's rural energy policy has been the biogas unit. Whereas until now the peasants have burned dry cow dung which damaged their eyes, cheap converters that will provide enough gas from two or three cows for cooking and heating water, lighting and extracting valuable fer-tilizers for an entire family. Many biogas unit and solar-electricity ment will come to the rural poor.

-M.P.



Raw Material Reserves.

From time to time, scientists and statisticians tell us how long it will be before we have used up the world's natural resources. We are obliged to take these limits seriously, since we have so far discovered no means of replacing the raw materials and energy sources we use today. If they were to run out, our very existence would be threatened. But we have one well-tried weapon in the fight against shortages and

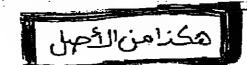
hardship: our spirit of research and invention. At VW, for example, we are investigating totally new propulsion systems which harness different forms of energy to the needs of individual transportation. Pipe dreams, perhaps, at the moment. It is more important right now for us to husband available reserves until these new solutions are ready for use. We are doing everything in our power to preserve the freedom of

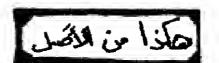
private motoring for as many people A 1967 Beetle weighed 800 kg (1764 as possible. We recycle waste products into our production processes wherever this is economically feasible. We have developed engines that make the most economical use of either petrol (gasoline) or diesel oil as a fuel - and we even supply these engines to other leading automobile manufacturers. More significant still, perhaps-today's Volkswagens weigh less than yesterday's.

lb), whereas a 1976 POLO tips the scales at only 685 kg (1510 lb). Does less weight have to mean reduced safety? This might have been the case if safety research and development had stood still. But thanks to the new concepts produced by our engineering team, today's VW models can meet and surpass the most stringent safety regulations. Tackling and solving all these prob-

lems hasn't exactly made building cars any easier for us. But it has meant a vast contribution to meeting future problems arising from raw materials and energy shortages. And it has proved again that human initiative is the greatest energy reserve that mankind possesses.









Arabs Counting on More Calories, Not Alternative Sources

By Joseph Fitchett

solar complete Description of health, the world's hunger for energy—are health, the world's hunger for energy—are heaten the world's hunger to the squeeze for home concentrating on how to squeeze for home more calories out of their hydrocarloped in homore calories out of their hydrocarght to be bon resources rather than on how energine to develop alternative sources of enerating to ectronics supply.

with the . This strategy is hardly surprising. S at present. This strategy is narray surprising. I climate is sing oilfields, OPEC countries can rovide all estretch their own profitable commer and a modity and also lift the planet's enancial reason. Another growth facn solar on ergy horizon. Another growth facow under to in the world energy equation is mis institute improved exploitation of natural will pre-ral gas, which until now was a distorted interly poor relation of oil.

experts at OPEC analysts are deeply skepti-te in the small about the industrial countries' nergy crit determination either to curb their down in wn in a consumption of oil or to seriously ich may pursue the development of alterna-position it tives—at least until the price of oil major di doubles. A figure often quoted as ose the grant an affective incentive is \$20 to \$25.

tive will then be financially viable gas were pumped and the percent-and the future of cil sales will be age of gas wastage increased. seriously threatened. So far, howevseriously threatened. So far, however, the costs of alternatives have economics of energy have spurred tended to rise along with oil-price most oil-producers to launch giant increases, albeit more slowly. So OPEC governments have concentrated on technology applied to oil it. Until now, this gas was too far production—in other words energy from any consumer market for it to conservation practiced at the be marketed profitably. However,

Natural Gas

They have made significant headway. The major breakthrough is the utilization of natural gas, which used to be conspicuously wasted. Often occurring in association with oil (in fact, gas mixed with oil provides the pressure to force it out of the ground), gas surfaces simultaneously with the crude oil and het to be to be

to the 1978 price of under \$13 a off or flaved. The giant flaming gas barrel.

Once this threshold of economic left black smudges on the sand in incentive is reached, OPEC anadaylight. As oil production in-lysts say, the search for an alterna-creased in the 1970s, more oil and

> gas-gathering schemes to harness their natural gas instead of flaring the leap in oil prices has meant that gas, as a "cheap" energy source, is being used locally for utilities (Kuwait, for instance, is switching its power/desalting plants to gas from oil) or else as a power and/or feedstock for locally built industry. At the same time, natural gas in the Middle East is starting to be ex-

iaces simultaneously with the crude oil and has to be disposed of.

In the Middle East, where the gas had nowhere to be piped to, the associated gas was mostly burned intensity methane gas for its annual continues markets.

The technology of gas exports varies. Saudi Arabia, for instance, already the world's largest oil exporter, intends to keep its high-associated gas was mostly burned intensity methane gas for its

As oil production increased in the 1970s, more oil and gas was pumped, and the

percentage of gas wastage increased. This waste is ending. The new economics of

energy have spurred most oil producers to launch giant gas-gathering schemes to

harness their natural gas instead of flaring it.

industrialization. At the same time, it has abundant other gas resources which will be processed into liquid petroleum gas (LPG) for easy shipment. This LPG, which includes such products as butane, can be adapted for individual heating and cooking and for some petrochemi-

to be the world's biggest LPG exporter in the 1980s accounting for about one-third of international LPG trade.

Long Pipeline

oil—is expanding its massive triangular gas deal with the Soviet Union and Europe, Using the longest gas pipeline in the Middle East, soon to be twinned with a new one constitution.

Long Pipeline Similarly Iran—whose vast gas reserves include some non-associat-

under construction, Iran sends nearly 1.3 billion cubic feet of gas daily over the Soviet border, in gas from 115 own fields to Western and Eastern Europe.

Algeria is the leader among the

oil states heavily committed to gas development (and talking about forming a cartel to do for gas prices what OPEC did for oil prices). This North African state is investing up-wards of \$20 billion in its bid to become a major gas-exporting

Plans are going ahead for the construction of an undersea gas pipeline from Algeria to Western Europe. It will run through Tunisia and then along the seabed across the Mediterranean into south Italy and later possibly beyond. However, the new technology of which Algeria has become the leading proponent is liquefied natural gas (LNG), a technique which contracts the gas volume 600 times for

This liquefaction process entails chilling the gas to minus 160 Celsius. Many forecasts of international energy availability in the coming decade already accept this technology as a success. However, the liquefaction process—entailing chilling the gas to minus 160 degrees

Celsius—has some drawbacks.
It is expensive. A biquetaetion installation easily can top \$1 billion since it must include a liquefaction "train" to refrigerate the gas, a pipeline to bring it (in Algeria's case, several hundred miles to the LNG terminals at Skikda and Arzew) and special cryogenic tankers (mainly built at La Ciotat in

Safety is another potential prob-lem. The LNG tankers amount to the last drop.

floating Thermos jugs: the liquid gas in the special spherical tanks is so intensely cold that a single drop of it which leaked could cause a ship's decks to become brittle and fracture. Although a major accident has never occurred, theoretically the escaping gas would freeze the surrounding sea, then form a lethal gas cloud by evaporation.

Besides cost and safety, Algeria has encountered a special problem in the form of long delays in its original contracts in the United States (the main intended market for Algerian gas) due to time-con-suming government reviews of sales. After successfully passing lengthy hearings by regulatory agencies, an initial Algerian con-tract was finalized (at a very low price), but others suddenly were confronted with the newly-created U.S. Department of Energy, Now the DOE has announced it can only rule on further Algerian gas im-ports once it adopts an overall U.S policy on imported energy

Japan, in contrast, already is relying on natural gas imported from the Middle East, notably LNG from Abu Dhabi. Under a 20-year contract, LNG from the newlycompleted facility on Das Island is supplying the Tokyo Power Co. the world's largest public utility

Expanded Role

The application of new technology is giving gas a newly expanded role of another kind in the Middle East energy picture—as the product used in secondary recovers. By reinjecting gas (or seawater in some cases) into oil fields, engineers can boost the declining pressure in the reservoirs and thus ensure that a greater proportion of the oil there is pumped out of the ground

tran, for instance, hopes in this fashion to raise its estimated reserves from 60 billion barrels of oil to 80 billion barrels—1 30 per-cent expansion in its effective oil reserves in its existing fields.

Secondary tecovery by remec-tion has become a matter of policy in Saudi Arabia and in the United Arab Emirates. In all the oil-producing states,

governments have become increasingly sensitive about the future of their oil fields as these resources have been taken over from the multinational oil companies and rocketed in value. The new owners are determined to see their oil is good

Japan Plans for Post-Oil Era With Sunshine Project

oportion of which: By Robert Y. Horiguchi

Djects

involving i. TOKYO (IHT)—When Japan here are o'll recled under the impact of the including lise in oil prices in 1973, officials in s peat and the Ministry of International Trade the conver and Industry promptly called for a te to meabrogram for national survival in the configuración of industry promptly called for a te to meabrogram for national survival in the Durces, 📆 es of inductost-petroleum age. They named it ter desalua he Sunshine Project.

system of a As the name indicates, its principle objective is harnessing solar 279 million barrels of oil. As the name indicates, its princirecently in lower. The project also provides recently mover. The project also provides program in or the development of geothermal it is becomergy, research into coal liquefactoreases in ion and gasification processes, hyperially the irrogen generation by electrolysis in the project and other methods such as using idustry, will be movement of waves and the differs to do meal evel of the ultimate objective is the development of medear fusion.

in the wake of the first pands times as much as an on-fuence consumption hat followed the oil crisis, the it is hoped sunshine Project was quickly apalmost all proved by the Diet and funded.

In the wake of the first pands times as much as an on-fuence constitution of the first pands and cooling system, but it would pay for itself in 10 years.

MITT's target price for such a so-

mestic electric appliances to devel- space.

Cloudy

expected the development of nuclear fusion actually but. In the wake of the near panic consumption hat followed the oil criefs the

sioned nine private companies in lar system is \$3,700 for a house has a maximum capacity the fields of construction and do- with 99 square meters of floor liters of hydrogen per day.

op solar housing systems for air conditioning and heating homes.

If a suitable system can be development is in solar batteries. These cost from \$90 to \$136 to generate one watt of power. oped at a price within reach of the compared with 68 cents to \$1.36 of average home owner, MITI estimates that when a million homes same amount of power in a nuclear plant. MITI would like to see this come to use a solar appliance, it will result in an annual saving of will result in an annual saving of its present price by the year 2000.

Solar cooling and heating systems costing \$11,000, which generate 1 kilowatt hour per square meter of solar panels on a clear day, are available. However, because of the number of cloudy and rainy days here, the average generate hour per square tories.

has a maximum capacity of seven A wave-operated electric power

generating plant is scheduled to un-dergo tests this July. It consists of an 80-meter-long, 500-ton barge-like vessel carrying three generators that are activated by turbines run by compressed air created from wave movements. By 1979, this device is expected to be able to produce 1,000 to 2,000 kilowatts per

Mirrors

A pilot solar energy power plant with a capacity of 1,000 kwh, devel-oped by the Mitsubishi Co., is also undergoing tests. It consists of 792 reflecting mirrors that direct solar heat to a collecting device atop a

Among the more ambitious projects under study, based on a hightral hearing and cooling system, but it would pay for itself in 10 years.

MITT's target price for such a soliters of hydrogen a day. The device an atomic-powered steel mill. Re-

search on this is being carried out by the Agency of Industrial Science and Technology in association with the Japan Energy Research Insti-

tute and 15 major corporations.

This project for a direct steelmaking process using high-temperature reducing gas is expected to reach its initial planning stage in 1980. It calls for the production of reducing gas from asphalt using a 50,000-kilowatt, high-temperature gas-cooled reactor with a thermal exchanger capable of handling 1.000 degrees Celsuis. A pilot low-calorie coal-pasifica-

tion plant for generating electric power has been put into operation using five tons of coal a day, while a 7.000-cubic-meter high-calorie al-gasification plant is now on the planning boards. Plans are also being drawn up for the construction of a gas-li-

geothermal energy were limited un-til recently. In 1975, geothermal power generation was limited to five localities, with a total output of 50,000 kwh. This has now been doubled with the operation of a geothermal power plant with a capacity of 50,000 kwh at Kakkonda, in the northern part of the island of

ment of a high-efficiency gas tur-bine, an electro-magnetic fluid elec-

tricity generating system and waste heat utilization.

In spite of the volcanic nature of

the country's terrain, efforts to tap

Honshu, Its operator, the Tohoku Electric Power Co., claims that it will be sufficient to meet 70 percent of household power demand in Morioka, a city with a population

quefaction plant with a capacity of one ton a day.

A parallel project, dubbed the Moonlight Program, has also been

The government's target is to generate 1 million kwh from geothermal energy by 1985 and 3 million kwh by 1990.

systems and components for the generation of power in steam, Diesel, gas turbine or nuclear power stations, including cogeneration plant. Profit from our know how!



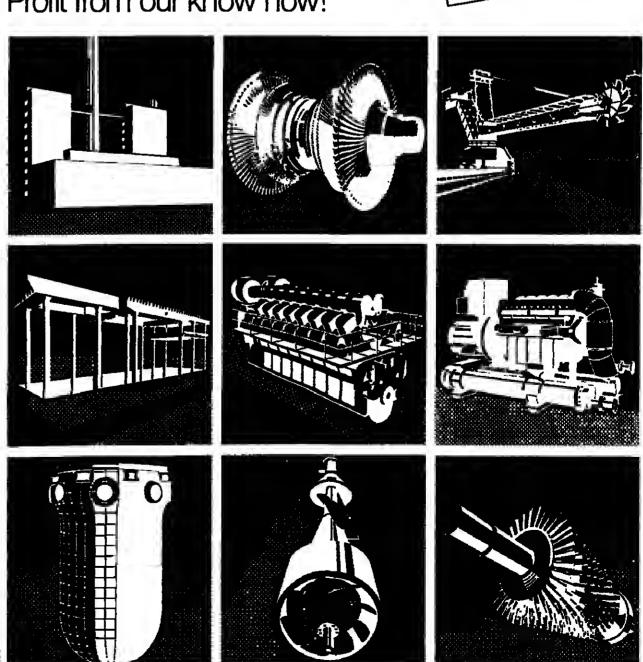


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